THE RUBBER AGE

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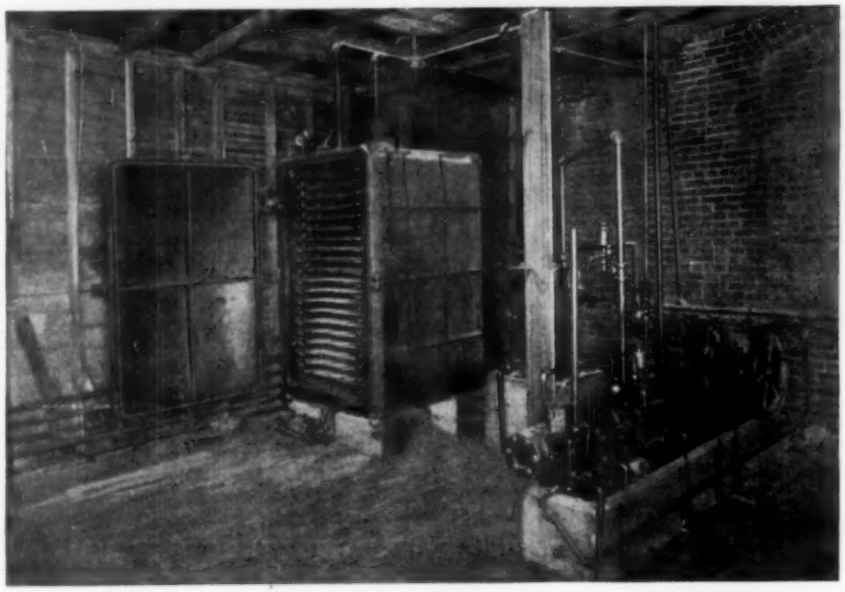

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THE RUBBER AGE

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The Aging of Vulcanized Rubber

By Dr. O. de Vries and H. J. Hellendoorn

The aging of a colloid-like rubber is a complicated phenomenon; as is the rule for gels, it may be influenced by every stage in its life-history. The keeping qualities of both unvulcanized and vulcanized rubber are of great practical importance, and in the study of methods of coagulation and preparation of plantation-rubber the influence of all factors on the keeping properties of unvulcanized and vulcanized rubber has to be duly taken into account.

We have, some time ago[1], published data on the influence of a number of coagulants on the keeping qualities of raw rubber; in this paper we will treat the changes in rubber vulcanized after our usual testing method,[2] and the influence of some factors in rubber preparation on these changes.

An Explanation

Fig. I. gives, in the form of dotted lines, the stress-strain curves and breaking points for one sample of rubber mixed with sulphur in the proportion of 7½ to 9½ and vulcanized for different times. The rapid increase in tensile strength when the cure is prolonged, and the maximum reached at a co-efficient of vulcanization of nearly 5 are clearly seen; similar curves have been reproduced on former occasions.[3] The continuous lines in Fig. 1 represent stress-strain curves and curves of breaking points as obtained by keeping at room-temperature vulcanized slabs cured at different times.

Sample A which, when cured for 90 minutes, shows curve O, A, and has a coefficient of vulcanization of nearly 3, gives after keeping stress-strain curves which gradually come lower down on the paper until, after some two and a half years, O, A″ is reached; the breaking points follow curve A, A′, A″. The elongation produced by a certain load, on keeping, becomes gradually less, or in other words, the vulcanizate becomes stiffer. The tensile strength at first increases much in the same way as it would increase when the sample had been vulcanized longer than 90 minutes (A, A′, at first following closely the dotted line); but after some time the tensile strength, though it still increases, does not any more reach the values obtained when a stress-strain curve of the same position is obtained by uninterrupted vulcanization (the break being found, for instance at A′ instead of at B). On further aging a maximum of tensile strength is reached, and from that time the sample on keeping not only becomes stiffer, but also loses in tensile strength, and this goes on till the well-known perished, hard, rather brittle vulcanizate is formed.

The changes on keeping vulcanized rubber-sulphur mixtures at room temperature are therefore very similar to those obtained on keeping the vulcanizate at 60-70 deg. C., which we described on a former occasion[4]; but the downward movement of the stress-strain curve is much slower. While the length at a load of 1.30 kilograms, on keeping at 60-70 degs., showed a decrease of 100 units in 2/3 to 3 days, such a displacement is only reached in 6-12 months when the vulcanizate is kept at room-temperature (which is in our case approximately 27 deg. C.). During the first few weeks the daily increase in length for a certain load is 0.4-0.6 units, so that 10 days keeping corresponds with approximately 1-1½ minutes longer vulcanization; in the later months the downward movement of the curve becomes slower, the daily decrease falls to 0.2-0.3 units in length and finally to 0.1 and less, without, however, the curve ever coming to a standstill (at least, not in our experiments, the longest time of keeping having been 868 days, or nearly 2½ years).

The above data relate to a vulcanizate brought to a coefficient of vulcanization of approximately 3. Longer cured samples show similar changes, of which Fig. 1 also gives examples. Sample B, vulcanized for 105 minutes (coefficient of vulcanization nearly 4) shows the same downward movement of the stress-strain curve which, however, in the first few weeks is somewhat slower than in sample A, being some 0.4 units daily. The tensile strength at first again follows the dotted curve, then turns to the inside, reaches a maximum, and shows a decrease; the maximum is reached after a shorter period of keeping than for the above, shorter vulcanized sample A.

Sample C, vulcanized for 125 minutes and thereby brought to our standard state of cure with a coefficient of vulcanization of nearly 5, shows similar changes on keeping. The downward movement of the stress-strain curve is still somewhat slower in the beginning (0.3-0.4 units daily); the tensile strength increases and shows higher values than are obtained for a stress-strain curve of the same position by interrupted vulcanization; after some time it reaches a maximum and then begins to fall off.

The above description gives an example of the average changes[5] in the first quality rubber, vulcanized and kept under our special circumstances of curing and testing. It will be seen that the principal points to be considered in studying the changes on keeping are:—

Points to Be Considered

1. The downward movement of the stress-strain curve, indicating that the vulcanizate gradually gets stiffer.

2. The increase and subsequent decrease in tensile strength, and the position of the maximum of tensile strength.

To give some idea as to the actual changes in different samples, vulcanized to different states of cure, Fig. 2 may serve. Sample I. gives similar results to the sample in Fig. 1; sample II. is a smoked sheet, while figures for a smoked ball prepared after the Brazilian method (III.) and for some inferior crepes from washings (IV. and V.) are also added. The letters A, B and C indicate vulcanizates of different state of cure for some of the samples. The tensile strength in all cases shows at first an increase when keeping the vulcanizate; the inferior samples IV. and V. reach the maximum of tensile strength after one month and then show a rather rapid decrease, but the ordinary samples continue to show an increase for 6, 10 and more months. It may be specially remarked that even samples cured to our standard state of cure, with

India Rubber Journal, London.

[1] *Archief voor de Rubbercultuur IV.* (1920), 210.

[2] *India-Rubber Journ.* 53 (1917), 101; treated in detail in *Estate Rubber, Its Preparation, Properties and Testing*, by Dr. O. de Vries (1920, Hachette & Co., London), Chapters XVII and XVIII.

[3] For instance, *Journ. Soc. Chem. Ind.*, 38 (1919), 91 T; *India-Rubber Journ.*, 52 (1916), 717; *ibed*, 57 (1919), 1163.

[4] *India-Rubber Journ.*, 53 (1917), 101 and 57 (1919), 77; *Archief voor de Rubbercultuur II.* (1918), 802.

[5] For further description of experiments and detail figures, see O. de Vries and H. J. Hellendoorn, *Archief voor de Rubbercultuur IV.*, Nov., 1920.

a coefficient of vulcanization of approximately 5, which are technically much overcured, do not show a rapid deterioration on keeping, but under our circumstances reach the maximum of tensile strength only after 3-8 and sometimes even after 12 or more months.

The lower part of Fig. 2 depicts the downward movement of the stress-strain curves. We have plotted in this figure the lengths at 1.30 kilograms, and not the lengths at breaking; the latter figure, which is used by many authors, is too much influenced by a more or less advanced breaking point (greater or smaller tensile strength) and gives confusing results; a much stricter comparison of the position of different curves is obtained by using the length at a fixed load. The downward

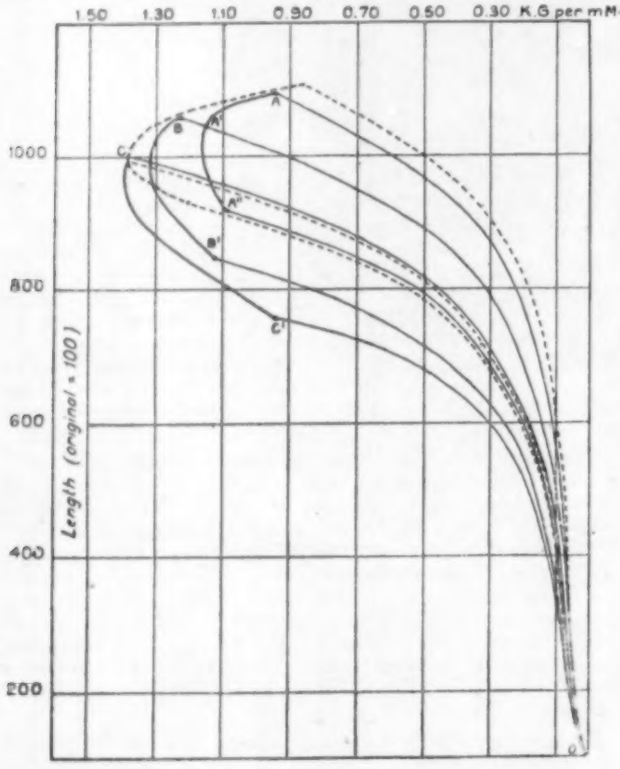


FIG. 1

movement of the curves described above can be easily read from this part of Fig. 2; at first a rather rapid decrease in length, which decrease on further aging becomes smaller and smaller without, however, coming to a stop. The more rapid initial decrease for the shorter cured samples, I.T, II.A, and V.A (the curves for which begin higher on the paper) as compared with the B's and the very rapid decrease for the inferior samples IV. and V. are also clearly seen from Fig. 2.

It may be specially remarked that the changes on aging are very similar for slabs from one sample cured for different times. The shorter cured samples show a somewhat more rapid downward movement of the curve in the first months, and take longer to reach the maximum of tensile strength, but with an increase of the time of cure, the changes on aging alter gradually; an abrupt transition is not found. By no means can it be said that undercured and overcured samples are unstable and show a rapid deterioration, while between them there should exist a state of cure showing the greatest stability, as Stevens[1] supposed. Whether such a stable "correct cure," lying between unstable under- and overcures, is found when using more complicated mixtures containing besides sulphur mineral fillers or other ingredients, we cannot say; in our rubber-sulphur mixture there is nothing to make one prefer one cure above the other as giving a specially stable vulcanizate; even the technically overcured samples with coefficients of 5 may show an excellent tensile strength on keeping for a year and more, though on longer keeping the decrease sets in earlier than in shorter cured samples. The more rapid decay on aging of samples cured to a coefficient of vulcanization higher than 3 per cent has been brought forward as an argument against the choice of an advanced state of cure as a standard of comparison in testing. Though we fully appreciate the fact that such advanced cures cannot be used for technical purposes, it remains to be seen whether in *comparative testing* the more rapid setting in of deterioration is not an advantage instead of a drawback, as it perhaps allows of a comparison between different samples after shorter keeping, and makes the aging tests quicker and sharper.

Besides our usual mixture of 92½ rubber and 7½ sulphur we have also studied the aging of mixtures containing 95 rubber and 5 sulphur. On a former occasion[2] we have shown that such a mixture, on vulcanization for increasing times, at first shows the usual downward movement of the stress-strain curve and increase in tensile strength; when all or nearly all sulphur has combined with the rubber, the curve comes to a standstill, and on further heating it goes upward again, the tensile strength diminishing.

Behavior of Vulcanizates

It was interesting to study the behavior of such vulcanizates on keeping at room-temperature, and especially whether the curve for long vulcanized slabs, on aging, continued its upward or showed a downward movement. The experiment taught us that in all cases the changes on keeping at room-temperature are similar; a downward movement of the curve, which gradually becomes slower and slower, coupled with an increase and subsequent decrease of tensile strength. A mixture of rubber with 5 per cent of sulphur, vulcanized much longer than necessary to bring all the sulphur into combination, and then kept for a long time at room-temperature, therefore shows the following stages:—

1. Real vulcanization, combination of rubber and sulphur coupled with a stiffening of the product, a downward movement of the stress-strain curve and an increase in tensile strength.

2. Further heating to the high vulcanization-temperature without further combination between rubber and sulphur; the stress-strain curve moves upward, the vulcanizate is weakened or disintegrated by the effect of heating, the tensile strength decreases.

3. Aging at room-temperature, comparable with a pectisation and stiffening; downward movement of the stress-strain curve, increase in tensile strength followed by a decrease, as in the aging of many gels.

We specially draw attention to these different phases, which deserve to be kept in sight in the explanation of several of the still so complex phenomena of vulcanization. For instance, the fact that, when using organic accelerators, a certain stress-strain curve is reached with a much lower coefficient of vulcanization than in mixtures without such an accelerator, may be wholly or partly explained by process 2 (disintegration by heat) having less occasion to hinder or keep back process 1 (vulcanization), or in other words the upward movement of the curve by process 2 is only small because of the short time of heating, which makes the downward movement of the curve by process 1 seem large. The behavior of mixtures which already vulcanize at ordinary temperature, and in which the effect of heat can therefore be eliminated, might provide interesting material on these points. A positive stiffening effect by the accelerator itself may, of course, also be found in some cases.

Comparison of Results

In comparing our results as above described with those that have in the meantime been published by H. P. Stevens[3], it will be seen that the conclusions are similar in the main, but differ in some details. The downward movement of the stress-strain curve is approximately 1½ times as rapid in our case; this may be readily ascribed to the higher room-temperature in our case (27 degs. against European temperatures). Stevens, in some experiments[4], at first found an upward

[1] *Journ. Soc. Chem. Ind.* 35 (1916). 872.
[2] *Journ. Soc. Chem. Ind.* 38 (1919), 93 T; *India-Rubber Journ.* 57 (1919), 1165. Compare also Ph. Schidrowitz and H. A. Goldsbrough, *India-Rubber Journ.*, 57 (1919), 269.
[3] *Journ. Soc. Chem. Ind.*, 35 (1916), 872; 37 (1918), 280 T, 305 T and 340T.
[4] *Journ. Soc. Chem. Ind.* 37 (1918), 340 T.

movement of the curve, which we never observed[1]; Stevens ascribed this to the differences in winter and summer temperature. Such complications do not occur in our experiments, as the room-temperature, either from daily or seasonal variations, seldom deviates more than 2 degs. from the average of 27 degs.

The tensile strength, in Stevens' experiments, showed a more rapid deterioration than in ours. The maximum was reached after 33 weeks keeping for samples which had been cured to a coefficient of 3 to 4 (against 80 weeks and more in our experiments with such samples), and it was reached in 10 or even 3 weeks for vulcanizates with coefficients of 4 and higher (against 30, 40, or even 80 and more weeks in our experiments). Whether this more rapid deterioration in tensile strength is also due to the cooler climate, or to the variations in room-temperature in Europe, or to the fact that Stevens used a mixture with 10 per cent of sulphur, so that more free sulphur was present in his vulcanized slabs, remains to be investigated. The differences in results, however, are well adapted to show how careful one must be in drawing conclusions, and especially in generalizing them—as, by the way, is always the case in the study of colloids.

After the above general description of the changes in vulcanized rubber at room-temperature we will now discuss the influence of different methods of preparation on the aging qualities. A harmful influence of several factors has been supposed by many authors, but it would seem that the anxiety on this point is much exaggerated. Our experiments[1] gave the following results:—

Results of Experiments

1. Coagulation with different doses of acetic acid (½ to 2 cc. per liter of latex, i.e., a wider range than the limits found in estate-practice), did not influence the aging of the vulcanized rubber.

2. The use of sulphuric acid as a coagulant in small doses (¼ to 1 cc. per liter of latex), as compared with acetic acid, had no influence on the aging. No harmful influence from the larger dose of this acid could be detected.

3. Coagulation with sodium chloride, which has to be used in rather large quantities (10 gms. per liter of undiluted latex) and gives a slow curing and slow drying rubber, and gave perfectly normal figures on aging.

4. Coagulation with sugar did not cause any deviation in the aging properties. Sugar has been often named as harmful to the rubber, and even as a cause of tackiness; be this as it may, in coagulation with sugar this substance is decomposed into acids (principally lactic), and the case is, therefore, similar to Nos. 1 and 2.

5. Rolling a varying number of times (3 to 24) in the preparation of crepe is without influence on the aging of the vulcanized product. The often assumed harmful influence of crepeing on the "nerve" can be detected neither in the properties after vulcanization, nor in the viscosity in dilute solution, nor in the aging of the vulcanizate. The fear of excessive crepeing probably exists only in the minds of those who confuse remilling of dry, several months' old rubber (in Europe) with the milling of fresh, wet coagulum, which stands even a much exaggerated crepeing without being harmed. Whether the plasticity, solubility and other related properties of the rubber are affected by crepeing, is another question which has not yet been sufficiently investigated.

6. Matured rubber shows a somewhat larger initial downward movement of the curve (0.6-0.7 units per diem), but further shows the same changes on aging as ordinary crepe or sheet. The natural accelerator does not exercise a marked accelerating influence in the aging of the vulcanized product.

7. A sample prepared after the Brazilian method (smoked ball) showed a rather large initial downward movement of the curve (0.8-1 units per day), which on further keeping became normal. The maximum of the tensile strength lay lower on the paper, i. e., it was reached after a longer storing than in ordinary samples.

8. Samples prepared from latex by rapid total evaporation by a current of hot air (Kerbosch patent) showed a similar downward movement of the curve as in cases 6 and 7 (in the beginning a decrease in length of 0.6-0.7 units per day). The tensile strength began to decrease after shorter keeping than usual.

9. Crepe from the first clots in partial coagulation[2], which shows a saffron-yellow or dark brown color, a higher content of non-rubber substances and somewhat inferior properties on vulcanization, gave on aging a normal downward movement of the curve, but a more rapid decrease in tensile strength, and is therefore somewhat inferior in keeping qualities.

10. Crepe from lower grades may show very different properties on aging. Even in the good types the downward

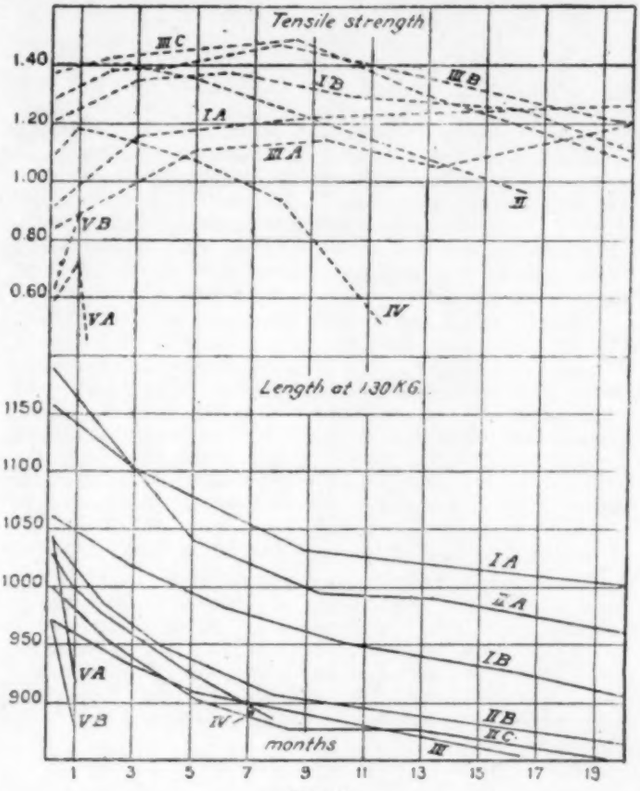


FIG. 2

movement of the curve is more rapid than in the vulcanized first grade product, for instance 0.7-0.8 units. In inferior types it may even reach 2-3.5 units per day (compare Fig. 2). The tensile strength, in good types, may show excellent figures throughout, an increase and decrease as in first quality crepe or smoked sheet, and may remain excellent during 1½ years keeping and more, even with samples cured to our standard state of cure. In inferior types the falling off in tensile strength may be very rapid, the maximum may be reached in one month and be followed by a rapid decrease (see Fig. 2).

In reviewing these dates it will be seen that even factors which are generally regarded with much suspicion, such as a large portion of acid in coagulation, or excessive crepeing, are without influence on the changes in vulcanized rubber at room-temperature.

It may be safely assumed that the differences in methods of preparation now prevailing on estates, which are all of minor importance, have no influence on the keeping qualities of the vulcanized product, provided the differences in rate of cure are taken into account by adjusting the mixture or the vulcanization.

Samples prepared after special methods, by which the content of non-rubber substances is markedly altered, may show somewhat different aging figures, while amongst the lower grades samples may be found with very poor keeping qualities—samples which, by the way, in the unvulcanized state also deteriorate and become tacky in the course of a year or so.

[1] Full description and details see *Archief voor Rubbercultuur IV.*, November, 1920.

The Manufacture of Rubberized and Rubber Coated Fabrics

By Frederic Dannerth, Ph.D.

The Rubber Trade Laboratory, Newark, N. J.

The following article on rubberized fabrics supplies considerable information of a historical nature. It is inserted in this issue in place of the article on vulcanizing, proofing, varnishing, impregnating and finishing which will appear in March.

It is interesting to note that one of the first important applications of rubber was in the waterproofing of textile fabrics. Among the earliest recorded attempts are those of Besson (1791), Johnson (1797), Champion (1811) and Clark (1815) all of which refer to processes for rendering fabrics waterproof by means of solutions of rubber. Nadier, in 1820 while experimenting in England invented a method for cutting rubber sheets and weaving these into fabrics.

In 1819 the firm of Charles Macintosh and Co. of Manchester, England entered into a contract with the Glasgow Gas Works, to receive for a term of years, the tar and ammoniacal water produced at their works. Charles Macintosh himself obtained from this coal tar by distillation, the waterwhite liquid which we call coal tar naphtha. He found that this had a remarkable "swelling effect" on rubber, and the mixture was well adapted for rendering his cloths waterproof. He accordingly (in 1823) invented a new process, and this was the beginning of the modern rain-coat industry. Hence the term "Macintosh" as applied to garments made of rubberized cloth.

Thomas Hancock, the business partner of Macintosh in 1836 invented a method of preparing rubber cements by "kneading the crude india rubber with naphtha." It should however be noted that up to this time no use was made of sulphur in any form for the purpose of setting or hardening the rubber. It was not until November 21, 1843 that this same Hancock received a British patent for the use of sulphur and heat in vulcanizing rubber.

The process invented by Alexander Parkes, of Birmingham, England, in March 1846, referred to the cold vulcanization of rubber by the use of sulphur chloride in carbon disulphide as a solvent. The earliest practical application of this process was in the vulcanizing of rubberized cloths. Strictly speaking it was for vulcanizing the thin layer of rubber or rubber compound which had been applied to the surface of these cloths.

Dry Heat Cures

Up until the year 1900 the Parkes process was used in this industry to the exclusion of all others. Since then the process of vulcanizing in dry steam was developed and adopted. In the year 1900, there were in France, only three factories which used the "dry heat process" in their works. Curiously enough, the process was invented right here in the United States, the land which gave birth to Goodyear's invention. In this new dry heat process it was necessary to mix the rubber with sulphur and some litharge in order to obtain the best results. As (black) lead sulphide was formed during the process, the application of the idea was limited to black colored fabrics, but very soon (1901) a French firm of rubberizers, succeeded in producing by this new process, rubberized fabrics in all shades except possibly the most perfect whites. They naturally kept their process within their factory walls as long as possible, but the advent of chemists in the rubber industry soon dissolved the secret. In 1891 Thomson published in the India Rubber Journal (England), his observations on the influence of copper on rubber, and the bad effects of this metal on all rubber mixings are now generally recognized and guarded against. Another interesting and technically important observation was made very early in the 90's. It was found that cotton calico, dyed black with logwood on an iron mordant, would not take or hold the rubber coating.

Early Patents

E. M. Chaffee in 1836, obtained U. S. Patent No. 16 for improvements in preparing and applying india rubber to cloth. This patent was acquired by Charles Goodyear and was contested in the case of: Day versus Union India Rubber Co. (U. S. Supreme Court 1857).

Nelson Goodyear of Newton, Conn. in 1845 obtained a U. S. Patent for the manufacture of india rubber fabrics. Nelson was the younger brother of Charles Goodyear.

Charles Goodyear in 1852 obtained U. S. Patent No. 9319 for a new method of making india rubber cloth. His numerous patents frequently gave rise to legal disputes and one of these is the famous case of Horace H. Day vs Charles Goodyear, heard before the U. S. Circuit Court, District of New Jersey, at Trenton, October 1, 1851.

Henry W. Joslin in 1859 obtained a U. S. Patent for improvements in the treatment of india rubber. This process consisted in the use of zinc sulphide in place of sulphur as a vulcanizing agent. In March 1859, Goodyear asked for an injunction against Joslin, but without success.

The early English patents of the Nineteenth Century pertaining to rubber are those granted to Macintosh (1823); Hancock (1843); and Parkes 1846).

Spiller's Resin

J. Spiller, an English chemist in 1865 (Journal of the Chemical Society) published some important observations on the oxidation of rubber. He had examined an old piece of rubber coated fabric, and removed from it the rubber compound. By means of alcohol he extracted from this a resin which had undoubtedly been formed by the action of oxygen on the rubber. The term "spillers resin" is therefore today generally applied to aceton soluble oxidation products of rubber. He confirmed his results by actually softening a piece of rubber in naphtha, spreading this cement over a cotton cloth, and exposing it to air[1].

Imports and Exports

The influence of the development in rubberizing is sharply reflected by the import statistics of England. Previous to 1830, the importations of rubber into the British Islands were inconsiderable, in fact they amounted in that year) to about 52,000 pounds (J. R. McCulloch). But during the year ending April 5, 1833, the quantity entered for consumption amounted to 178,676 pounds. The price of this material varied from six pence to two shillings (about 12c to 50c) per pound. We are further informed that the import duty on rubber (or caoutchouc, as it was called) was reduced at that time, from 47 shillings to 1.0 shilling per hundred-weight (112 pounds). From which we gather that there was a tendency toward free trade at that time, so far as raw materials were concerned. The report of the Inspector General of Imports in Great Britain shows that the gross receipts from imports of "India rubbers" in 1832 amounted to approximately 773 pounds sterling (3800 dollars).

(Continued on page 369)

* Copyright by Frederic Dannerth, 1921.

[1] See, Whitby: "Plantation Rubber" Longmans, 1920.

Rubber Goods in British India

The following information relating to the conditions obtaining in British India with respect to the demand for rubber goods appeared in a recent number of Commerce Reports, issued by the Bureau of Foreign and Domestic Commerce, of the Department of Commerce, Washington, D. C. The report is as follows:

Imports of Rubber Goods into Bombay District

[Vice Consul John C. Moomaw, Bombay.]

There is no manufacture of rubber goods in the Bombay consular district, and such goods of this nature as are used are imported.

There is a considerable demand for rubber tires and tubes in this district, and, owing to the material increase in the importation of automobiles, it is anticipated that the demand will grow in proportion. At the present time, due to the local shortage in petrol, the market is somewhat dull, as the owners of cars have not been able to use them as much as they ordinarily would. This condition is temporary, however.

The market is well supplied and competition is keen. Several tire manufacturers have their own branch offices in Bombay devoted exclusively to the introduction of and distribution of their products.

The principal sources of supply, named in the order of the value of imports therefrom, are England, the United States, France, and Italy.

The tires are distributed through the local agents and branch offices of the manufacturers, who keep stocks on hand for the purpose of meeting the orders of the automobile dealers and garages that act as retailers.

The retailers either pay cash or are allowed to settle every three months in accordance with what arrangements are made. As between the manufacturers and the importers if no special credit terms are arranged, the terms of payment are usually shipping documents on payment.

The sizes expressed in inches in use are 30 by 3½, 32 by 3½, 34 by 4, 34 by 4½. The following sizes expressed in millimeters (millemeter = 0.039 inch) are also used, 710 by 90, 760 by 90, 765 by 105, 815 by 105, 820 by 120, 880 by 120, and 895 by 135.

At present the clincher type is decidedly the most popular but the straight side of quick-detachable type is being gradually introduced.

Imports of Rubber Tires and Tubes

The following table shows the imports of rubber tires and tubes for the official years ending on March 31 therein named:

Articles and countries.	1913-14	1917-18	1918-19
Rubber tires:			
Great Britain	$27,853	$447,690	$516,956
Ceylon	3,019	11,900	7,530
Germany	20,300	.....	.....
Belgium	916	162,071	.....
France	14,664	.....	87,007
Italy	15,048	196,318	73,705
Japan	.....	32	1,037
United States	.....	46,201	135,276
Other countries	80	59	1,134
Total	81,880	864,271	822,645
Rubber tubes			
Great Britain	$23,208	$124,214	$117,510
Ceylon	220	710	350
Germany	17,840	.....	.....
France	8,235	84,859	26,648
United States	.....	7,376	33,385
Other countries	98	.....	101
Total	49,601	217,159	177,994

Rubber Boots and Rubber Goods for Industrial Purposes

The market for rubber boots and shoes in this district is practically negligible, and there are no official statistics available which show any imports of this class of rubber goods.

As there are 175 cotton mills working in this district and other enterprises needing rubber goods for industrial purposes, it may be stated that there is a large demand for them. Due to the unfavorable exchange situation at the present time, the market is dull, though it is not overstocked, as the Calcutta market is reported to be.

The terms of payment as usually granted by British manufacturers are 30 to 60 days' documents on payment, but most American firms insist on irrevocable letters of credit.

The principal sources of supply of this class of rubber goods are Great Britain and the United States.

They are distributed through indenting houses and local agencies of the manufacturers. The indenting houses do not as a rule keep stocks on hand, but some of the local agents keep large stocks.

Rubber Hose and Other Goods

It has been stated that rubber hose shrinks in the long journey from the United States to India on account of being coiled—e. g., a hose 60 feet in length will shrink about 4 feet. The local buyers will not take shrunk hose, and the market for American hose is handicapped on this account, as some American manufactures will not make allowance for the shrinkage.

The official statistics do not segregate this class of rubber goods, and the table given below represents imports of these goods as well as those mentioned further on. The imports of these rubber-manufactured goods (except apparel, boots, and shoes) were:

Imported from—	1913-14	1917-18	1918-19		1913-14	1917-18	1918-19
Great Britain	$414,638	$576,785	$689,234	Austria Hungary	$4,527	.....	.....
Ceylon	3,989	1,456	4,090	Japan	138	$38,456	$80,281
East African Protectorate	13	516	.....	United States	773	17,133	52,957
Germany	212,431	.....	.....	Victoria, Australia	.....	.....	533
Belgium	3,173	.....	.....	Straits Settlements	.....	.....	9,190
France	28,341	4,097	8,036	Other countries	106	54	676
Italy	2,332	.....	177	Total	670,461	638,496	845,174

There is a fair market for rubber clothing which is worn only by the European population and the higher class of natives. This comes principally from England, and is retailed during the monsoon period lasting from June 1 to October 1. There is a considerable demand for insulated wire and cables and the market will undoubtedly consume a larger proportion in the next few years on account of new electrical projects under way and under contemplation. The market is fairly well supplied and competition is brisk, the principal sources of supply being the United States and England. These products are distributed through local agencies and branch offices and stocks are kept on hand.

The terms of payment are as above stated. There is a small demand for rubber soles and heels imported chiefly from England. American soles and heels are practically unintroduced to this market. They are distributed through indenting houses.

Rubber toys come principally from Japan and are handled through local agents of Japanese houses.

There is a fair demand for druggist sundries which come chiefly from England and the United States.

Imports of Rubber Goods into Karachi District

[Consul E. Verne Richardson, Karachi.]

As will be seen from the table below showing imports into Karachi of manufactured rubber for a five-year period 1914-15 to 1918-19 (statistics for 1913 not available), the year ending in each instance on March 31, the volume of the trade is extremely small. No doubt the 1919-20 figures will show substantial gains, especially in tires and tubes for motor vehicles, for it was not until that period began that a war-time embargo on those articles was lifted, and importing began again on a much augmented scale. The table follows:

Articles and countries.	1914-15	1915-16	1916-17	1917-18	1918-19
Tires for motor vehicles and bicycles:					
United Kingdom	$4,682	$1,978	$1,652	$79	$90
United States	.....	335	2,503	2,463	151
Other countries	.....	.....	.....	26	.....
Total	4,682	2,313	4,155	2,568	241

Tubes for motor vehicles:					
United Kingdom	845	319	223	712	288
United states		111	.....	594	.....
Other countries			255	.....	.....
Total	845	430	478	1,306	288
Other manufacturers of rubber:					
United Kingdom	16,590	25,664	32,329	26,938	53,629
Germany	2,644	175	.....	.....	.....
Japan	.....	.....	1,672	709	3,432
United States	151	.....	755	1,467	897
Other countries	188	.....	177	16	3
Total	19,573	25,843	34,933	29,175	57,962
Grand total	25,100	28,586	39,566	33,049	58,491

The Market for Rubber Tires

Generally speaking, the market for rubber tires is governed by conditions ruling in the automobile industry, which is already becoming a prominent feature of the trade of this consular district. Great Britain, France, and the United States are the chief sources of supply. Distribution is effected through the manufacturers' own depots and sales agencies, most of which are held by automobile firms, although a few general merchants also hold tire agencies.

In regard to types of tires preferred, the nonskid variety is undoubtedly the favorite; straightside tires are not very popular. The sizes in most general request are the 30 by 3½ inches, of which it is estimated the sales are 10 to 1 of any other size. The other best sellers are 760 by 90, 765 by 105, 810 by 90, 815 by 105, 820 by 120, 875 by 105, and 880 by 120, these being the metric measurements.

The Market for Rubber Footwear

There is practically no market for all-rubber footwear in this part of India. In Karachi the annual rainfall seldom exceeds 3 inches. In the Punjab and other upcountry provinces of the district there is a much higher average, but rubber shoes and boots are not in general request.

The Market for Rubber for Industrial Purposes

Manufacturing plays but an obscure part in the industrial life of the northwestern areas of India, and even where manufacturing plants are established they are for the most part of small capacity, their products being designed for local consumption. Export of articles locally manufactured has not yet been attempted. As of rubber footwear so of rubber clothing—there is no present demand for it. Insulated wire and cables are absorbed in small volume by the electric light and power departments of the municipalities or the private companies supplying current.

Rubber goods for hospital uses and for general sale by druggists are in fair request. The hospitals buy many of their supplies direct, without recourse to local dealers, but seldom by competitive bidding. The prevailing inclination is toward British products. In this respect the hospital trade is a hard one to win by an outside agency seeking to gain a foothold in the country.

Good Market in Madras Consular District

[Consul L. G. Dawson, Madras.]

The Madras consular district provides a very good market for automobile tires with approximately 5,700 automobiles and 60 trucks. There is a representative of an American tire and rubber goods manufacturer stationed permanently in Madras to look after sales. A representative of another company stationed at Colombo makes frequent sales trips to Madras and the other cities of the district. A British company maintains a branch sales office in Madras to supply the trade in southern India, and furnishes by far the largest part of the demand. The Madras office of the British company receives supplies by direct steamer from England, and supplies its trade from the Madras warehouse. The representatives of the American companies supply their trade from stocks in Bombay and Calcutta and by direct shipments from the United States. The terms of payment vary from cash at time of shipment to credits extending as long as 90 days in the case of firms with good credit ratings. The rating of any firm of importance in southern India can be secured from the banks in New York City doing a foreign exchange business. These are: The Chartered Bank of India, Australia, and China; the Mercantile Bank of India; the National Bank of India.

As the great majority of automobiles in use in southern India are the medium-priced American cars, the tires used are those in general use in the United States. The clincher type of tire is the one in general use here, although the straight-side is beginning to reach the market and will increase in use.

Imports of Rubber Tires

The imports of rubber tires for automobiles and motor cycles and of tubes for rubber tires during the pre-war year, April 1, 1913—March 31, 1914, and during the two latest years for which detailed statistics are available are given below:

Imported from—	1913-14 Number.	1913-14 Value.	1917-18 Number.	1917-18 Value.	1918-19 Number.	1918-19 Value.
Rubber tires:						
United States	36	$547	1,789	$47,302	300	$10,306
United Kingdom	8,615	34,817	6,966	105,958	13,447	133,641
Ceylon	25	447	421	9,459	257	6,510
Straits Settlements	.....	.....	.....	.....	160	3,393
Germany	20	1,452	.....	.....	.....	.....
Other countries	.....	.....	.....	.....	2	49
Total	8,696	37,263	9,176	162,719	14,166	153,899
Tubes:						
United States	4	19	1,207	7,575	91	344
United Kingdom	784	3,537	6,041	24,323	11,572	26,197
Ceylon	2	16	789	2,372	81	847
Straits Settlements	.....	.....	.....	.....	302	3,466
Total	790	3,572	8,037	34,270	12,046	30,854

Rubber Boots and Shoes

Southern India affords a very small market for rubber boots and shoes. Ninety per cent of the population wears no shoes at all, and the Europeans and that portion of the Indians who wear shoes are not accustomed to wearing rubber shoes or boots. The tropical climate makes them unnecessary even during the rainy season.

There are no statistics covering separately the importations of rubber boots and shoes, since these are inconsiderable. Such importations are included in the classification, "Boots and shoes, of material other than leather". The imports under this head consist principally of cloth shoes and slippers from the United Kingdom. The imports for three years are as follows

Imported from—	1913-14 Pairs.	1913-14 Value.	1917-18 Pairs.	1917-18 Value.	1918-19 Pairs.	1918-19 Value.
United Kingdom	11,681	$7,304	2,897	$3,193	4,566	$5,466
Straits Settlements	1,059	301	6,417	465	797	112
Japan	1,246	94	4,804	1,046	1,537	392
Germany	1,365	373	.....	.....	.....	.....
Austria Hungary	1,648	381	.....	.....	.....	.....
Other countries	517	162	248	102	218	280
Total	17,516	8,615	14,366	4,806	7,118	6,250

The principal importers of rubber boots and shoes are the Madras department stores.

Rubber Goods for Industrial Purposes

The numerous mines, milling companies, and other industries of southern India are the principal users of belting, packing, hose, etc. Many of the larger companies purchase and import their own supplies, while others purchase from the wholesale dealers and importers of Madras. Rubber belting is largely supplied from the United Kingdom, and the terms of payment are much the same as for tires— that is, cash at the time of shipment in the case of the less well-known dealers, credits of 60 or 90 days to the firms with good credit ratings.

Imported from—	1913-14	1917-18	1918-19
United States	.....	$649	$31,086
United Kingdom	$44,448	75,072	101,107
Ceylon	717	534	182
Hongkong	.....	704	.....
Straits Settlements	.....	27	440
Japan	13	345	.....
Germany	$10,990	.....	.....
Belgium	491	.....	.....
Other countries	.....	$123	.....
Total	56,659	77,454	$132,815

The Rubber Goods Market of China and Japan

Information of an interesting nature relating to the rubber industry and the market for manufactured rubber goods in China and Japan has been issued recently by the Bureau of Foreign and Domestic Commerce, of the Department of Commerce, Washington, D. C. This information is in the form of reports submitted by American consuls and will serve to give an excellent idea of the export possibilities of the various countries touched upon.

China

[Gyneth Knight, clerk at American consulate general, Shanghai.]

In general it may be stated that there are no factories within the Shanghai consular district engaged in the manufacture of rubber goods of any kind. Less than 40 tons of india rubber and gutta-percha were imported into all China during the year 1919, which year exceeded all previous years. Approximately one-half of these 40 tons entered through the port of Shanghai. These small amounts indicate little manufacturing in rubber goods, if any, throughout China. No scrap waste, or reclaimed rubber is imported into China. Small amounts of waste and old rubber are exported through the port of Shanghai.

The following table, showing, in quantities of pounds and values of dollars, the imports of india rubber and gutta-percha for all China, indicates the development of this market within recent years:

Imported from—	1913		1918		1919	
	Pounds.	Value.	Pounds.	Value.	Pounds.	Value.
Canada			267	$ 613	4,400	$ 1,140
Great Britain	6,267	$ 2,306	133	171	3,333	2,187
Germany	12,000	2,523				
Hongkong	5,200	2,311	2,133	1,600	2,667	2,120
Japan	17,867	6,249	32,667	17,465	57,067	18,712
Singapore, Straits Settlements, etc.	933	687	933	1,037	10,000	7,015
United States	533	836	5,467	2,676	9,867	5,088
All others	2,133	387	533	271	1,733	531
Gross imports	44,933	15,299	42,133	23,833	89,067	36,793
Reexported to foreign countries	10,133	3,296	400	226	267	126
Net import	34,800	12,003	41,733	23,607	88,800	36,667

The imports of india rubber and gutta-percha and manufactured articles therefrom, including boots and shoes, for all China for the same years were:

Imported from—	1913	1918	1919
Canada		$2,725	$48,572
France	$22,129	11,365	23,375
Germany	19,868		
Great Britain	43,160	25,821	46,038
Hongkong	18,152	27,031	43,328
Japan (including Formosa	26,739	728,377	1,426,421
Philippine Islands		1,455	46,126
Russia and Siberia	165,328	12,978	25,901
Singapore, Straits Settlements, etc.	188	4,395	14,331
United States	$12,143	$128,746	$468,227
All others	2,223	573	5,454
Gross imports	309,930	943,466	2,147,773
Reexported to foreign countries	42,599	65,598	162,005
Net import	267,331	877,868	1,985,768

The chief port of entry for rubber and rubber goods in China is Shanghai, the second in importance being Dairen. In 1919, three-fifths of the india rubber and gutta-percha imported into China passed through Shanghai, and approximately one half of the india-rubber and gutta-percha goods were imported through this port.

Market for Rubber Tires in the Shanghai District

There are approximately 3,500 passenger automobiles in Shanghai, the greater portion of which are the lighter four or five passenger cars, with, perhaps, some 20 to 30 per cent of the heavier seven-passenger cars. There are about 150 motor trucks in use in this consular district, about 75 per cent of which use solid tires, though there is a decided tendency to supersede these by the pneumatic truck tire.

It is estimated that there are, conservatively, 25,000 rickshaws in Shanghai alone, all of which use pneumatic tires—principally the double (outer and inner tube) tire, size 36 by 2 inches, or 900 by 50 millimeters (millimeter = 0.393 inch). A very large proportion of these are Dunlop tires, manufactured in Japan, and sold at a price much less than American-made tires are being sold for here. There are also in use in Shanghai the carriages known as Victorias, all of which are supplied with rubber tires. There are possibly 2,000 of these vehicles in use here.

It is said that cord tires are more in demand than are the fabric type. All cords are straight side, whereas the fabric type embraces both straight side and clincher type. The standard metric and standard inch sizes are used here as in the States.

The greater proportion—variously estimated in the absence of definite statistics from 70 per cent to 90 per cent—of tires used on automobiles in Shanghai are of American manufacture, the foreign firms competing in this line being but two in number, one English and one French.

Methods of Distribution

Methods of distribution of tires are similar to those used in other lines of rubber goods. In some cases tire houses abroad have a representative on the ground here, who works through an importing house with sub-agencies or dealers. Frequently dealers order directly through an importing house from firms abroad, the importing house receiving a commission on the order.

Owing to climatic conditions, which are unfavorable to the preservation of rubber goods, the system of consigned stocks of tires (or other rubber goods) is impractical. Deterioration is very rapid when stocks are held too long, and the incentive for quick turnover being less strong in the case of consigned goods lessens the desirability of this method.

The total value of the net imports of tires for automobiles in 1919 was over 10 times as great as in 1913 in this consular district, and nearly 50 times as great as in 1918, the reexports from Shanghai to other Chinese ports in 1918 decreasing materially the net imports. This indicates the development of the tire market in this district. In this connection it may be stated that there are numerous service stations and garages in Shanghai, where tire changes, adjustments, etc., are performed as skillfully as in the United States.

Future development in this line of tires, as well as in bicycle and motorcycle tires, is entirely dependent upon the good roads' movement. At present a two-hour automobile drive covers the roads which are fit for automobiling, and until sufficient appropriations are made to develop roads in the surrounding country, the purchase of motor vehicles, and consequently the market for tires, will be limited.

Rubber Boots and Shoes

While the imports of rubber boots and shoes, including galoshes into this consular district in 1919 were approximately 14 times as great as in 1918 (statistics for 1913 being unobtainable), still the market for such goods is limited. Foreign-made rubbers do not fit the native shoes, and galoshes and boots are not popular with the Chinese. It would seem that there might be a limited market developed in rubber soles, if made on the pattern of the native shoes without heels.

Rubber Goods for Industrial Purposes—Other Rubber Goods

Rubber goods for industrial purposes, such as belting, packing, etc., find a fairly ready market in China, limited at the present time only by China's industrial condition. Factories are steadily increasing in number in China, and this market will increase in proportion.

Rubber clothing, while popular with the foreign population, is not used to a great extent by the natives. The principal reason for this is that the foreign-made clothing does not conform to the Chinese ideas of length and breadth. Because

of this, there would appear to be a much better market for "frictionized" or rubberized fabric, from which garments upon Chinese patterns could be made.

The Chinese market for rubber druggists' sundries, such as rubber gloves, hot-water bottles, hard-rubber goods, etc., is excellent. Goods are distributed through agents and through the aid of catalogues, printed in English and Chinese, with illustrations. One firm stated that their business in such goods had doubled since May, 1920, and that it was difficult to get sufficient goods to supply the demand from the native population.

In general, the basis of financial credits in the importation of rubber goods is the same as other imported commodities. Cash on delivery of documents in the case of untried creditors, or when goods go to districts in which unsettled political conditions prevail, and deferred payments varying from 30 to 90 days with established creditors, are the rule. Terms of payment are purely matters between the parties to the transaction and dependent upon circumstances.

Prices to distributors and to dealers vary also, in some lines being the same, and in others varying from 2½ to 5 per cent in favor of the distributor.

The import duty upon india rubber and india-rubber goods is 5 per cent ad valorem, to which duty is added a fee of 5 per cent of the duty charges for wharfage and warehouse dues.

Japan

[Vice Consul H. T. Goodier, Yokohama.]

Owing to a protective tariff and to other encouragements from the Japanese Government, along the line of its policy to make Japan as nearly independent economically as possible, the rubber industry in Japan has developed remarkably since the first factory was started in 1886.

For the last 10 years, considerable attention has been paid to establishing and leasing rubber plantations in the Malay Peninsula and in Sumatra. There are now 20 companies, with an approximate aggregated capital of $17,447,500, owning or leasing more than 70,000 acres, engaged in this activity. Added to this acreage is a considerable area privately owned or leased by Japanese.

Apparently every encouragement is given these investments, and as Great Britain seems to have changed its policy of 1917 to withhold further leases in the Malay Peninsula to Japanese, the industry has flourished. Notwithstanding the present economic depression in Japan, this industry is, therefore, in a fairly healthy condition.

Japan is favorably located to become a center and distributing point in the Far East for rubber and manufactures thereof. In so far as foreign rubber goods do not too closely compete with Japanese manufactures, a good market is found here for all classes of such articles, with the possible exception of rubber boots and shoes, although the import of these has considerably increased within the last three years, notably from the United States. However, in the native costume rubber footwear is unnecessary, as when it is rainy the people either go barefooted or wear high clogs. With an increased wearing of foreign clothes, the market for rubber footwear at moderate prices, and of broader toe measurements for the Japanese foot, should be very satisfactory.

As for rubber tires, the increasing number of automobiles in Japan (there are now over 6,000 registered cars) and the bad roads make Japan alone a comparatively good market for automobile tires. However, several large Japanese concerns are now making such tires, which, while not as good as American products, are fair in quality and considerably cheaper. This is an important point, as Japanese are very apt to consider only the first cost of a thing.

Distribution and Terms

Distribution is carried out along usual lines—from the manufacturer or importer, through the wholesale and retail merchants, to the consumer, although importers often also conduct a wholesale or retail business. The terms are usually cash on delivery, or in the case of well-known companies, one or even two months' credit. The trade journals here devoted to the rubber industry are published in Japanese.

The value of certain yearly imports of india rubber manufactures into Japan were: 1912, $1,133,433; 1913, $982,914; 1915, $225,252; 1917, $349,379; 1918, $688,298; 1919, $924,996.

The above figures, taken in connection with the expansion of domestic manufacture in recent years, are indicative of the considerably increased consumption of rubber goods in Japan since 1915, notwithstanding an export trade that grows larger each year.

The principal countries whence rubber manufactures have come are:

Countries.	1912	1913	1915	1917	1918	1919
United States	$348,708	$292,846	$128,210	$512,805	$658,627	$880,128
Great Britain	655,023	593,685	94,794	33,390	29,262	41,937
Germany	101,845	89,363	1,645	2,708	.....	.....

Since 1912 the United States has supplied an increasing percentage of the annual imports into Japan until 1919 when Great Britain again showed signs of a more active participation in the import trade of rubber manufactures into Japan.

Values of imports of rubber manufactures into Japan for 1913, 1918, and 1919, classified as to principal articles from the three countries above mentioned, are given as follows:

Countries.	1913	1918	1919
UNITED STATES			
Unvulcanized india rubber	$51,254	$1,635	$17 518
Dental rubber	37,408	52,550	77,496
Rods and cords	26,961	105,305	92,085
Plates, sheets, and tubes	44,921	141,723	161,796
Belts and beltings for machinery	22,688	85,022	61,324
Threads, strips, bands, rings, and washers	33,859	91,878	1,882
Boots and overshoes	41,887	29,428	268,886
Lumps, bars or rods, plates, and sheets	11,623	24,620	52,027
Bicycle tires, etc.	8,843	598	2,794
GREAT BRITAIN			
Unvulcanized india rubber	30,621	7,992	10,358
Dental rubber	1,895	1,384	7,302
Rods and cords	13,714	1,229	3,173
Plates, sheets, and tubes	14,305	2,501	4,220
Belts and belting for machinery	888	.....	.....
Threads, strips, bands, rings, and washers	28,832	10,394	.....
Boots and overshoes	313	.....	31
Lumps, bars or rods, plates, and sheets	3,700	2,620	3,853
Bicycle tires, etc.	492,881	.....	302
GERMANY			
Unvulcanized india rubber	10,522	7,992	.....
Dental rubber	.....	.....	.....
Rods and cords	3,798	.....	.....
Plates, sheets, and tubes	10,908	.....	.....
Belts and beltings for machinery	124	.....	.....
Threads, strips, bands, rings, and washers	7,596	.....	.....
Boots and overshoes	481	.....	.....
Lumps, bars or rods, plates, and sheets	11,327	.....	.....
Bicycle tires, etc.	15,970	.....	.....

Imports of Crude and Waste India Rubber into Japan and Principal Countries of Exportation

Total yearly imports of crude india rubber into all of Japan, and into Yokohama, from 1914 to 1919, inclusive, are given as follows:—

Year.	Yokohama.	All Japan.	Year.	Yokohama.	All Japan.
1914	$504,971	$1,070,097	1917....	$1,534,163	$4,551,417
1915	614,390	1,710,649	1918....	2,332,029	6,454,695
1916	1,597,689	3,612,135	1919....	2,805,982	8,656,049

The noticeable increase in imports, especially from the Straits Settlements, is probably indicative of the efforts of the Japanese Government to encourage in every possible way the development of an independent source of supply, through Japanese ownership and leasing of rubber plantations in the Malay Peninsula.

Imports of crude india rubber into Japan, by principal countries, from 1912 to 1919 inclusive, are stated as follows:

Countries.	1912	1913	1914	1915
Straits Settlements	$818,431	$882,945	$676,693	$861,002
British India	140,358	238,563	222,966	468,918
Great Britain	229,971	407,638	158,834	196,274
Dutch India	72,951	8,881	1,672	112,743
United States	160,075	99,812	8,142	58,643

Countries.	1916	1917	1918	1919
Straits Settlements	$2,476,694	$3,133,099	$5,920,251	$7,912,647
British India	741,351	985,320	233,504	205,687
Great Britain	239,467	266,044	125,902	356,729
Dutch India	82,361	44,367	73,554	21,775
United States	67,213	100,907	80,916	151,174

Imports of waste india rubber into Japan, since 1915, from the principal countries are as follows:

Countries.	1915	1916	1917	1918	1919
China	$6,528	$14,417	$42,989	$32,614	$54,331
Australia	.....	6,944	49,265	21,603	93,495
United States	6,539	10,448	5,584	.....	84,342
Great Britain	11,022	9,116	13,710	.....	.....
Philippine Islands	4,911	5,774	7,988	5,474	17,517
Straits Settlements	285	988	4,722	11,510	19,041

Growth of Rubber Industry

As an apparent result of the Japanese Government's policy, the manufacture of all rubber goods in Japan has increased over threefold since 1915 (theYokohama consular district having the largest share of this industry, which is centered in Tokio), as shown in the table below:

Year.	Number of manufacturing establishments.	Number of employees.	Value of output.
1915	265	5,043	$3,341,842
1917	166	6,618	7,491,889
1918	188	8,245	11,443,346

Included in these totals are the following for insulated electric wire and cable:

Year.	Number of manufacturing establishments.	Number of employees.	Value of output.
1915	17	1,134	$2,172,285
1917	24	2,692	5,396,183
1918	37	3,549	9,504,795

The constant tendency is toward centralization and amalgamation into large concerns. Therefore, while this industry, in common with others has suffered considerably since the present economic depression began in March and April of 1920, it is, on the whole, in a relatively healthier condition and more ready to take quick advantage of better markets in the future than are many other industries. However, both in manufactures and in imports there is an oversupply, which tends to keep the industry uncertain, and prices such as to be an extremely unreliable guide in the future, fluctuating accordingly as it is feared from time to time that some one will commence "dumping" in order to secure money.

Exports of Rubber Goods

Japan is now becoming an important rubber goods exporting nation. Available statistics thereof are given as follows (crude, para, smoked-ribbed, and sheets not included in the available Japanese Government statistics):

Year	Tires of all kinds.	Insulated electric wire and cable.	Other rubber manufactures.
1913	(a)	$125,322	(a)
1915	$1,701,196	448,536	(a)
1917	2,035,689	1,554,779	$306,194
1918	2,246,708	4,149,680	610,762
1919	3,546,347	4,193,232	1,251,406

a Figures not available for these years.

Tires go chiefly to China, the Dutch Indies, and the Straits Settlements; insulated electric wire and cables to the Dutch Indies, China, Kwantung Province, Australia, and Asiastic Russia; whereas other rubber manufactures find markets principally in the United States, various countries in Asia, and in Great Britain.

As Germany is not able to supply toys in the quantities it formerly did, toy making has attained considerable development in Japan. Rubber toys especially are now being made. In 1918 rubber toys to the value of $382,029 were exported from Japan. In 1919 the exports thereof had increased to $669,867.

Formosa

[Consul Henry B. Hitchcock, Taihoku.]

Formosa depends for its supply of rubber goods upon imports from Japan. Even goods of other than Japanese manufacture are ordered in most cases through importers in Japan proper or from stocks of imported goods maintained there by large wholesale houses.

The demand here is still relatively small. Formosa is but just beginning to develop industrially and its population, agricultural for the most part, has very little need as yet for rubber goods of any description.

There are not over 75 automobiles and motor trucks on the island. Seventy per cent of the tires in use on these vehicles are of Japanese manufacture. The remaining 30 per cent are of American manufacture. American tires have the reputation of giving better service and being cheaper for the mileage in use than Japanese tires. But the initial lower cost of Japanese tires has greater weight with the Japanese buyer than would be the case in countries having more experience with automobiles. Japanese tires retail here from $40 to $80 each; American, at $95 each. Tires for bicycles and jinrikishas are practically all of Japanese manufacture.

Rubber boots and shoes are not used to the extent customary in the United States. The streets very seldom have sidewalks and, in rainy weather, those who can not afford to ride in jinrikishas, wear clogs or go barefoot.

Rubber Goods for Industrial Purposes Find Best Market

Rubber goods for industrial purposes present the best opportunity for the sale of American rubber goods in Formosa. In most of the other classes, however, goods of Japanese manufacture are supplanting the imported goods. Imported rubber goods are becoming more and more restricted to the classes having very special uses or whose manufacture presents difficulties of technique or expense. Packing is practically all imported from the United States. Belting is also to a considerable extent of American manufacture.

The following are the only statistics available for the imports of rubber goods from Japan and other countries into Formosa: In 1919 there were imported from Japan rubber and manufactures thereof worth $38,933. These figures do not include imports of tires for bicycles and jinrikishas.

The following lists of dealers and importers interested in various lines of rubber goods may be obtained from the Bureau of Foreign and Domestic Commerce or its district and cooperative offices by referring to the titles and file numbers:

	File No.
Medical schools and hospitals in China	FE-13001
Importers and dealers in boots and shoes in China	FE-13010
Importers and dealers in motor vehicles in China	FE-13011
General importers and exporters in China	FE-13024
American firms in China	FE-13027-A
Department stores in China	FE-13047
Importers of motor vehicles in Japan	FE-11003
Importers and dealers in drugs and chemicals in Japan	FE-11010
General importers and exporters in Japan	FE-11012

The Manufacture of Rubberized and Rubber Coated Fabrics

(Continued from page 364)

The rapid increase of importations as indicated by the statistics is undoubtedly due to the developments of Macintosh, Hancock and the other inventors in the field of waterproofing fabrics.

The rubberizer will as a rule warn his customer that fabrics containing large amounts of copper are not adapted for rubberizing or rubber coating. But a clause is or should be inserted in order forms, whereby the rubberizer is relieved of all responsibility for damage and defects if the goods contain appreciable amounts of copper.

A "converter" is one who buys from a textile manufacturer, fabrics *"in the gray"* He then either bleaches, dyes and finishes them in his own plant or sends them out to be treated by a concern which specializes in these processes. Finally he may sell them in this "converted" condition to a manufacturer of rubberized fabrics,—or he may have them rubberized on his own account.

If the rubberizer accepts the converted fabric for rubberizing, he also accepts responsibility in case the materials in or on the fabric should later affect the rubber. The most desirable plan then is to obtain from the converter a statement showing that the goods have been bleached, dyed or finished with due regard to the limitations of the rubberizing process. This means that the converter or the rubberizer must know what chemical substances have a bad effect on rubber.

NEWS OF THE INDUSTRY

News -- Personals -- Financial -- Building Activities -- New Products

Carbon Black Industry in Danger

Godfrey L. Cabot, President of The National Gas Products Association, Comments Upon Recent Legislation Which Threatens this Industry to a Considerable Degree

The fact that legislation is under way in several states for the purpose of restricting the use of natural gas in the production of carbon black brings home the fact to rubber manufacturers that the supply of that ingredient is threatened with extinction. Laws have already been passed in Wyoming which have practically stopped the production of the material within the borders of that state and several other states have under consideration similar measures framed for the purpose of conserving the resources of the country in gas and oil.

Recently THE RUBBER AGE received a letter from Godfrey L. Cabot, president of the National Gas Products Association, Boston, Mass., commenting upon the situation and calling the attention of the rubber industry to the necessity of awakening to the need for action. Mr. Cabot's letter is as follows:—

"Something like five years ago, it was discovered that carbon black gave better results in the tires of automobiles than any other ingredient that could be incorporated in rubber, increasing the tensile strength of rubber about 15-fold and giving about 25 per cent more tensile strength than any other ingredient, not excepting lamp black from oil, which gives from 15 to 44 per cent less tensile strength, according to the testimony of Frederick J. Maywald an expert on rubber. It, also, was found that it gave greater tractable effect, particularly on a smooth, wet roadbed, thus diminishing the danger of skidding and increasing the mileage obtained with a given amount of gasoline. It, also, increases the durability of the tire.

"I have in my hand, a piece of black tire that has been in my office five years and does not show the slightest deterioration with time and an incredible tensile strength.

Carbon Black Industry Attacked

"Now, the carbon black industry has been very seriously attacked and is threatened with even more serious attacks in the near future and it behooves all users of mechanical rubber to come to the rescue of this thriving and important industry and not allow it to be destroyed through ignorance and misapprehension of the conditions under which it is carried on and its effect upon the public welfare.

"The two large carbon black factories formerly operating in the State of Oklahoma have been driven from the state by the unwise action of the Public Service Commission. There is several times as much gas going to waste in the open air in the State of Oklahoma as would make all the carbon black that is made in the world and yet through a misapprehension of field conditions, and prejudice, inspired, perhaps, by adverse interests, this useful industry has been driven from that state, (where it ought most to thrive,) to the detriment of the general public and to the detriment of the state which has one less branch of industry.

Beneficial Results

"Not only that, but the carbon black industry has brought natural gas for sale into a great number of different communities previously without it, some of which would never have received it otherwise and others would not have received it till later than they actually did. There are probably communities in Oklahoma not yet supplied with natural gas that would have been supplied had the carbon black industry been allowed to continue.

"If a pipe line has to be laid past a small village to carry gas to some carbon factory, it is possible to furnish that village with gas with some profit or at least without material loss. If there is no need of a line for other purposes than the supply of that village, it might be impossible to furnish gas to such a village, except at a great loss, by reason of the leakage, interest on capital account, overhead expense, etc. For instance, a line that leaks 4,000 feet of gas a day, is a source of pecuniary loss to a company that only sells 10,000 feet of gas a day, on an average, but if it supplies 4,000,000 feet of gas a day, the leakage is of small importance and the taking on of the village does not increase this leakage.

"A law was passed last year in Wyoming, calculated to drive from that state the two factories there operating. One of these has already shut down. The other is at present operating at the risk of being fined $1,000 a day for this law has just been sustained by the Supreme Court of the United States. There is a strong agitation headed by the Governor of Louisiana to attack and curtail, if not entirely prevent the manufacture of carbon black in Louisiana, which is at present the chief source of the carbon black of the world.

"A law has just been introduced in Montana to put the carbon black industry out of business there. Previous attempts in West Virginia have been defeated and it is hoped that no attempt will be made this year in that state, but the Supreme Court of the United States, by its recent decision, has withdrawn from carbon black makers the constitutional guarantees which they believed were irrefragable and which had been sustained by the lower Federal courts.

"We hope, therfore, that consumers of rubber goods throughout the United States will appreciate that their interests are affected and that through the mistaken zeal of legislators, misinformed by the propaganda of selfish interests, a material harm may be done to people of the United States.

"Incidentally, this article will be printed with ink made from carbon black, for practically all the black ink of this country and a large part of that of foreign countries, is made with carbon black.

"If you will give the privilege of your columns to this communication, you will be serving the people of this United States, as well as those more specifically interested in the manufacture of carbon black, of rubber goods, and of printing ink."

Tire Manufacturing to Increase

Notwithstanding the apparent lethargy which pervaded the automotive tire and general rubber goods industry the first of February there is an undercurrent which presages a renewal of activity in the Akron manufacturing district within the next thirty days.

One of the reassuring signs of early increase in the output of automobile tires comes from the Goodyear Tire & Rubber Co. Activity of this concern is awaiting the consummation of negotiations for refinancing. But meanwhile the men in charge of sales forsee a demand which will require a doubling of the present output to fill.

Akron and Cleveland newspapers have credited to Vice-President G. M. Stadelman a statement that Goodyear will increase its production to 18,000 tires a day when the refinancing plans are completed and the company is provided with funds to prepare for the summer trade.

Officials of the Goodyear also have denied reports current in Akron that the plant would be closed until the refinancing plans are completed.

There also are reports that the Firestone Tire & Rubber Co. officials are contemplating putting two shifts of seven hours each on within a very short time.

Miller Rubber Co. officials also are planning to resume factory activities during February.

But most promising of all is the statement from the B. F. Goodrich Co. predicting a shortage in tires within a brief period if indications are fulfilled.

U. S. Rubber Issues Statement

Owing to the unusual conditions prevailing at the present time, the U. S. Rubber Company, through Col Colt, chairman of the board, has issued a preliminary financial statement for 1920 for the particular benefit of the stockholders. The statement as issued shows the general results of the company's operations during 1920 and its position at the close.

The report shows a gain in earnings over 1919, net profit being $21,275,524 allowing for a dividend of $19.82 on common stock. In 1919 the net profit was $17,730,237 and dividend $17.59 a share.

Total sales last year were $255,744,635, the largest in the history of the company. In 1919 the sales amounted to $225,589,465 and in 1918 to $215,398,425. The balance sheet shows current assets of $195,505,243 and current liabilities of $153,452,426. The report states that inventories were written down $11,020,605, but actual supplies on hand were much larger at the close of 1920 than at the end of 1919. The current report places inventories at $122,873,231, whereas inventory in the previous report was put at $87,633,699.

The chief items of the income account are shown in the following table:

	1920.	1919.
Sales	$255,744 685	$225,589,465
Net income	26,925,173	21,396,099
Interest	5,649,649	3,365,862
Net profits	21,275,524	17,730,237
Preferred dividends	5,200,000	5,041,476
Divs. subsidiary cos.	18,718	19,567
Common dividends	6,480,000	2,098,576
Surplus	9,576,806	10,570,618

"In order to prepare these statements so soon after the close of the year it was necessary to estimate some of the figures," said Mr. Colt, "but we are satisfied that they fairly reflect the results of the business for 1920 and the company's position at the close of the year, as it will appear after the accounts have been audited in the usual manner.

"The company at no time during the year had any so-called forward contracts for crude rubber, and, therefore, was in a position to take advantage of the low market prices which have prevailed for some months, with the result that at the close of the year your company had on hand and subject to delivery about seven months' supply of crude rubber at an average cost of .2679c. per pound. Therefore, it was not necessary to write off anything on account of crude rubber.

"As to all other materials and supplies, the company had a short inventory position during the latter part of the year, and, therefore, was able to take advantage of the decline in prices.

"Obviously operations for the year 1921 will get the benefit of the reduced prices as the result of writing down inventories, which prices are considered fair on the basis of prevailing market.

"In accordance with past conservative practice in respect to making reserves, your directors will in due time consider the advisability of appropriating some part (not exceeding $6,000,000) of the net surplus for 1920 to be set aside as a reserve to take care of any contingencies that might arise.

"The larger part of the new construction which was laid out prior to 1920 has been completed and paid for, and your directors feel there will be no necessity for additional expansion of fixed properties for some time to come."

Goodrich Sales Show Increase

A recently issued statement by the B. F. Goodrich Co. states that the company's sales for the year 1920 amounted to $150,000,000 a considerable increase over 1919 when sales totalled $141,343,419. It is also said that approximately 1,200 shares of preferred stock are to be retired and that from the surplus will be established a reserve of $10,000,000 to provide for losses on material purchased for future delivery. The statement appeared over the signature of Secretary F. C. Van Cleef and says in part:

"The net sales for the year amounted to approximately $150,000,000. At the meeting of directors held on January 19, 1921, a dividend of three and one-half (3½) per cent was declared on the preferred stock, 1¾ per cent payable on April 1, 1921, to the preferred stockholders of record at the close of business March 22, 1921, and 1¾ per cent payable on July 1, 1921, to preferred stockholders of record at the close of business June 21, 1921.

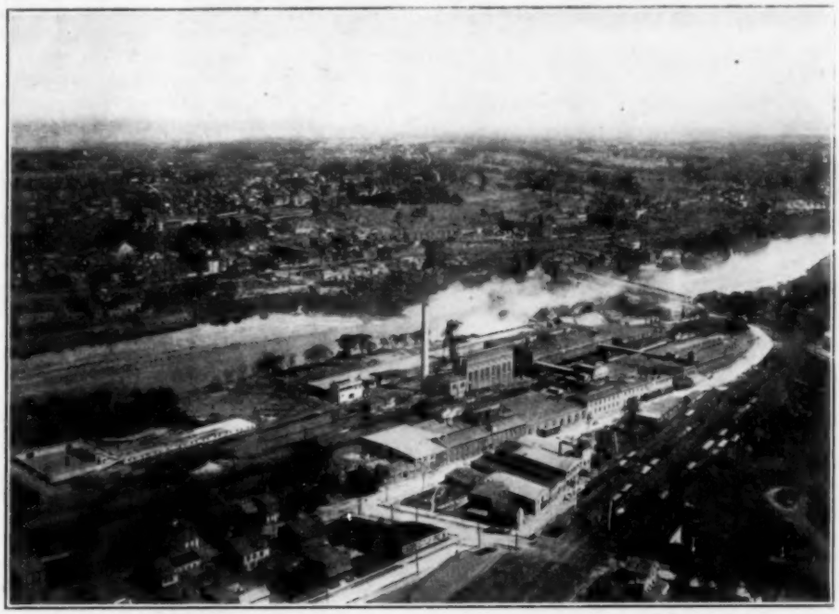
"The directors voted, subject to the approval of the stockholders at the annual meeting in April, to retire 11,880 shares of the preferred stock prior to July 1, 1921, in accordance with the requirements of the charter. The directors also voted to set up out of the surplus a reserve of $10,000,000 to provide for all possible contingent losses on raw material commitments for future delivery.

"The directors determined to take action with regard to the May dividend on common stock at a meeting of the directors to be held in April. The resignation of A. B. Jones as a member of the executive committee was accepted by the board."

Diamond State Fibre Expanding

One of the most interesting commercial uses of the airplane has been in the taking of photographs of large industrial plants. The above picture is the first airplane photograph ever taken of a vulcanized fibre plant. The plant is the Bridgeport plant of the Diamond State Fibre Company, Bridgeport, Pa., (near Philadelphia). This is the largest of the eight plants of this company, who are the largest fibre manufacturers in the world.

The Diamond State Fibre Company's



PLANT OF DIAMOND STATE FIBRE CO., BRIDGEPORT, PA.

plant is located at Bridgeport, Pa., on the west bank of the Schuylkill River about twenty miles northeast of Philadelphia. On one side of the plant is the main line of the Philadelphia & Reading and the Schuylkill River on the other.

Every process in the fibre industry from the raw material stage to the finished product is made in this plant. Over thirty acres of land, with thirty buildings, containing 400,000 square feet of floor space are occupied. The buildings are of modern fire-proof construction, and contain the latest and most up-to-date equipment. A private telegraph station with both Western Union and Postal Telegraph connections is maintained. At the present time an experimental wireless station is being installed.

This plant furnishes employment for over 850 people. A large self-service lunch room is maintained for the employes who have been with the company three months or more. The employes also have their own baseball and basket ball teams.

Additions to the plant are constantly being made in order to keep up with the ever-increasing demand for the products of the company. In the lower left hand corner of the photograph will be seen the foundations for a large paper mill which will soon be turning out Diamond-F protective papers.

Rubber Association Directors Meet

The personnel of the standing committees of the Rubber Association of America, Inc. was decided at a meeting of the board of directors of the association which was held at the Union League Club, New York, Tuesday, January 18. As the result of this meeting the following committees were chosen to serve during 1921:

Committee on Nominations: B. G. Work, B. F. Goodrich Co.; H. S. Firestone, Firestone Tire & Rubber Co.; G. B. Hodgman, Hodgman Rubber Co.; F. C. Hood, Hood Rubber Co.; H. E. Sawyer, United States Rubber Co.

Legislative Committee: Charles Neave, chairman, counsel, the Rubber Association of America, Inc.; F. C. Van Cleef, B. F. Goodrich Co.; Ernest Hopkinson, United States Rubber Co.

Auditing Committee: E. M. Bogardus, Fisk Rubber Co.; W. O. Cutter, United States Rubber Co.

Banquet Committee: A. W. Warren, Hodgman Rubber Co.; G. A. Ludington, Fisk Rubber Co.; H. C. Miller, B. F. Goodrich Co.

Outing Committee: J. V. Mowe, chairman, Kelley-Springfield Tire Co.; W. J. Kelly, Poel & Kelly; H. G. Palmer, Goodyear Tire & Rubber Co.

Arbitration committee, (term January 1921-January 1924): A. A. Garthwaite, Lee Tire & Rubber Co.; G. A. Ludington, Fisk Rubber Co.

With respect to the Traffic Committee and the Industrial Relations Executive Committee, the board was of the opinion that as the personnel was composed of men thoroughly familiar with the work that a greater degree of efficiency would be obtained by their reappointment and it was therefore formally decided to handle the matter accordingly.

The board also decided to approve the appointment tentatively made by the executive committee of the Mechanical Rubber Goods Manufacturers' Division of the personnel of the Mechanical Goods Specification Committee, to be constituted of the same companies as during the past year. It was also decided to request the general manager to convey to the executive committee of the Mechanical Goods Division the view of the board of directors that that committee should hereafter assume the authority for the appointment of the Mechanical Goods Specifications Committee.

It had been suggested that the General Tax Committee consisting of F. C. Van Cleef, chairman, B. F. Goodrich Co.; E. S. Kochersperger, Hood Rubber Co., and Kennedy M. Thompson, United States Rubber Co., might very properly take care of all tax matters connected with the association work, including the excise tax situation. This was done particularly for the reason that it is desirable to have a small committee, well versed in this specific phase of the tax subject and available for frequent conferences with the management of the association. The board approved the suggestion and requested the general manager to notify the General Tax Committee that the scope of its activities was enlarged to include excise tax matters which had been given attention by the former Excise Tax Committee.

The advisability of appointing the personnel of these committees was considered particularly in the light of the possibility of an affiliation of the Rubber Association of America, Inc. with the Rubber Trade Association (whose membership consists of rubber brokers, dealers and importers). Representatives of the crude rubber interests on the board of directors participated with particular interest in this discussion, which resulted in the conclusion that the matters formerly handled by the two committees referred to might well be given attention by a small committee of five members, three representing crude rubber interests and two representing manufacturing interests.

The suggestion was made that the name of the committee be simply "Committee on Crude Rubber" which was considered to be comprehensive, and it was accordingly so voted by the board. The appointment of the personnel of the committee was left to the president of the association with power.

Sales for Export Regulations

The Rubber Association of America has issued a legislative bulletin calling the attention of the trade to Treasury Department Regulations 47 (revised December 1920) relating to the excise taxes on sales by manufacturers under section 900 of the Revenue Act of 1918.

No substantial changes were noted in these regulations other than those relating to sales for export. The attention of the trade was directed to Articles Nos. 42 and 43, as to the new certificates required where delivery of the article is to be made to the purchaser or his agent within the United States, and the changes in the "proof of exportation."

Increased Tire Consumption

As a result of unusally mild weather throughout the country this winter, approximately 3,000,000 more passenger cars and trucks are in service than were being used a year ago, according to reports sent in to the Travel and Transport Bureau of the B. F. Goodrich Rubber Company.

Many northern states which are usually snowbound during several months of the year have had only a few light snow falls so far this winter and auto traffic has never been impeded. The result has been that thousands of motorists who formerly stored their machines at the first sign of winter have kept them continously in use.

The best indication of the increased use of autos is given by reports obtained by the Goodrich bureau from gasoline distributing companies in widely separated sections. The reports show that gasoline consumption this winter in northern states is at least 150 per cent greater than last year, many cities showing increases ranging as high as 400 or 500 per cent.

Reliable estimates placed the number of cars in use last winter—which was unusually severe—at 4,500,000. This year it can be conservatively estimated that at least 7,500,000 are in service.

Rubber Association Statistics

The Rubber Association of America has issued a bulletin containing statistics compiled from Questionnaire No. 103 which contains information with respect to the rubber manufacturing and reclaiming industries for the first six months of the year 1920. In addition Questionnaire No. 104 has been sent out to the members of the manufacturing and reclaiming industries. This calls for data relating to these industries for the second six months of 1920. Following are the statistics compiled from Questionnaire No. 103:

STATISTICS COMPILED FROM QUESTIONNAIRE NO. 103
COVERING THE FIRST SIX MONTHS OF *1920*

Number of rubber manufacturers reporting statistics 142
Number of reclaimers (solely) reporting statistics 7
(See attached lists of names)

AVERAGE TOTAL DAILY NUMBER OF EMPLOYEES
199,750

	Reported by Mfrs. who also reclaim	Reported by Reclaims solely	Total	Approx. Amt. Scrap used per pound of Reclaimed Produced
No. of pounds Reclaimed Rubber Produced from Raw and Cured Scrap	49,609,828	57,177,838	106,787,666	1 lb., 5 oz.
No. of pounds Scrap Rubber (including raw and cured scrap) Consumed in Production of Reclaimed Rubber	63,865,870	74,131,737	137,997,607	

Products	No. of pounds Crude Rubber Consumed		Total Sales Value of Shipments of Manufactured Rubber Products	
Tires and Tire Sundries:				
Automobile and motor truck casings	145,812,997		$167,922,703	
Automobile and motor truck tubes	36,801,828		23,347,600	
Solid tires	19,649,218		11,093,889	
Other tires and tire sundries	7,292,520		10,169 593	
*TOTAL—Tires and Tire Sundries		213,173,874		$394,340,828
Other Rubber Products:				
Mechanical Goods	16,507,842		$45,555,735	
Boots and Shoes	16,214,728		19,957,003	
Other Products	9,271,559		33,118 718	
*TOTAL—Other Rubber Products		41,994,129		$182,642,232
GRAND TOTAL—ALL PRODUCTS		255,168,003		$577,388,210

*NOTE—It should be noted that the above totals of "Tires and Tire Sundries" and "Other Rubber Products" include some figures which are not shown under the various items, which is due to the fact that some of the reports received were not itemized.

Attention is directed to the fact that the totals above are the result of a complication of statistics furnished by individual rubber manufacturers and reclaimers in the United States and do not include figures of manufacturing firms located in Canada, as did the "Statistics Compiled from Questionnaires Nos. 101 and 102" covering the year 1919.

Personals of the Trade

Brown Heads Grand Rapids—Warner Leaves National Tire—Syracuse Officers and Directors—Bucyrus Elects Officers—Alderfer Heads India Tire—Richards Leaves Quabaug

Brown Heads Grand Rapids

At the second annual stockholders meeting of the Grand Rapids Tire & Rubber Corporation, of Grand Rapids, Mich., L. A. Brown, formerly district manager for the United States Rubber Company, was elected president. Mr. Brown is well known by many of the leading dealers and distributors from coast to coast,

L. A. Brown

and the news that he is now at the head of a big tire plant will be welcomed by a host of friends.

The Grand Rapids Tire & Rubber Corporation's plant, which is fully erected and completely equipped with the latest facilities for manufacturing high grade cord tires, has a capacity of 1,000 tires and 5,000 heavy grey tubes per day.

The company's manufacturing policy provides for the production of cord tires exclusively, and will market their product under the trade name: Corduroy Cord, This name having been selected because it best gave expression to the distinctive features of their tire. The company is adequately financed and will be under production by April 1st.

Warner Leaves National Tire

S. L. Warner, who has been vice-president and general manager of The National Tire & Rubber Company of East Palestine, Ohio, from the time the company was organized and the plant purchased in March, 1917, has resigned effective February 1st to accept a position with the Robinson Clay Products Company of Akron, Ohio. Mr. Warner will become general manager of one of their subsidiary companies, namely, The Clearfield Sewer Pipe Company, operating a large plant and mines at Clearfield, Pa.

Mr. Warner was formerly with the Robinson Clay Products Company in an executive capacity at their general offices at Akron and it is a renewal of old friendships to again join his former associates. Under Mr. Warner's management, The National Tire & Rubber Company has been one of the most successful of the smaller companies, having paid dividends on both preferred and common stock without a break since early in 1918. A successor for Mr. Warner's position has not yet been named by the National directors.

Syracuse Officers and Directors

The stockholders of the Syracuse Rubber Co., Inc., Syracuse, N. Y., manufacturers of Syra-Cord tires, at their recent annual meeting elected the following directors: E. R. Caldwell, R. P. Byrne, R. L. Caldwell, Frank Shane, J. B. Losey, F. G. Mauthe and K. D. Smith. The directors elected the following officers: president, E. R. Caldwell; first vice-president, R. P. Byrne; second vice-president, Frank Shane; secretary and treasurer, R. L. Caldwell; assistant-treasurer, J. B. Losey.

Reports by the different officers indicated that the Syracuse Company is in a strong technical position, having practically no liabilities, high priced materials and tires on hand. J. B. Losey, general manager reports: "Prospects of business for the coming year seem bright. We have a fine lot of spring orders on hand and are lining up many new and promising distributors."

Bucyrus Elects Officers

At the recent annual stockholders meeting of the Bucyrus Rubber Co., Bucyrus, Ohio, the directors announced the sale of the plant, its equipment and machinery to the C. M. French Rubber Co., of Cleveland. The stockholders approved the sale.

The same members of the board of directors were reelected. They are: Phil Heater, W. J. Schwenek, Jacob Colter, Robert S. Carroll, Daniel Kalb, M. R. Lewis, Phil Browarsky, A. J. Richards, H. A. Paxton and W. A. Blicke.

Following the election the board of directors met and organized, electing Phil Heater president, Jacob Colter vice-president, W. J. Schwenek secretary, and W. A. Blicke treasurer.

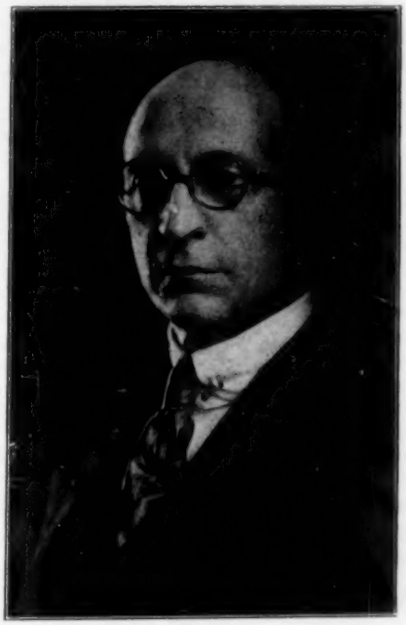
Alderfer Heads India Tire

J. M. Alderfer was re-elected president of the India Tire and Rubber Co. at the annual stockholders' meeting. Other officials re-elected were: J. K. Williams, D. A. Grubb, P. C. Searles. Officials of the company read to stockholders an unusually bright outlook for the coming year's business.

Richards Leaves Quabaug

T. G. Richards, who recently resigned from the Quabaug Rubber Co., North Brookfield, Mass., was graduated from the Massachusetts Institute of Technology in the Class of '94, course in mechanical engineering. He served as an instructor in the engineering laboratory of the Institute for a year, and then went to the Boston Hose & Rubber Company in Cambridge where he was in charge of the engineering department for two years.

The next year he was made purchasing agent, the following year assistant-



T. G. Richards

superintendent, and in 1899 he became the general superintendent. He held this position for seven years during a period of very rapid development of that company and the rubber business in general, and in 1906 he organized the B. & R. Rubber Company which afterwards became the Quabaug Rubber Company, of North Brookfield. He has been the president and manager from its organization.

Mr. Richards is an indefatigable worker, and an inspiring leader. Many men prominent in the rubber business today owe much to the early training they received from him. He has had a very wide experience in mechanical rubber goods compounding and has always taken a keen interest in this branch of the business. He is the originator of the valuable method of compounding by volume.

R. J. Firestone a Vice-President

The entire automotive industry will be interested in the announcement of R. C. Stewart, president of the United States Motor Truck Company, Cincinnati, Ohio, that R. J. Firestone, whose connection with the rubber industry has made him well known throughout the entire country, has been elected a vice-president of the United States Motor Truck Company.

Gunn Heads Lincoln Highway

The Lincoln Highway Association has announced the election of James Newton Gunn as president of the organization. Mr. Gunn is president of the United States Tire Co. He takes up the duties as head of the Lincoln Highway work as successor to F. A. Seiberling, who felt unable to attend longer to the responsibilities of the position.

Mr. Gunn, as a director and founder of the Lincoln Highway Association, has been in close touch with the aims and purposes of the organization. The United States Rubber Co. through his interest and that of its president, C. B. Seger, recently announced its willingness to finance the construction of the "ideal section" somewhere along the highway.

Spreckels Makes Promotions

The Spreckels "Savage" Tire Company, San Diego, Cal., announces the promotion of Wayne Compton from manager of sales to corporations to assistant sales manager. Mr. Compton has been with the Spreckels company for several years, coming up from a salesman to the position he now holds. He states that, while in common with all other manufacturing enterprises, the tire industry has been dull the past few months, business is now beginning to feel the influence of the spring demand, and that the prospects are bright for a healthy and reasonably rapid return to normal.

Other promotions recently announced by The Spreckels "Savage" Tire Company are those of George W. Greene from assistant-superintendent to superintendent and Ralph E. Brown from chemist to assistant-superintendent.

Phillips Leaves Essex

R. H. Phillips, sales manager of the auto accessories and mechanical goods department of the Essex Rubber Co., Trenton, N. J., resigned on February 1. Mr. Phillips has been with the Essex Rubber Co. over twelve years. He has been elected secretary and treasurer of the National Tire Co., Inc., and the Reliable Tire & Rubber Co., Inc., of Trenton, N. J., succeeding Albert Numbers. These two companies have been in business over five years, and their goods are sold extensively in this country and abroad.

Schenzinger with Wishnick-Tumpeer

The Wishnick-Tumpeer Chemical Company, Chicago, announces the addition to their sales force of F. A. Schenzinger, who has been connected with the Chicago office of the Roessler & Hasslacher Chemical Company for the past twenty-two years.

Exports of Rubber for November

Figures recently issued by the Bureau of Foreign and Domestic Commerce, of the Department of Commerce, Washington, D. C., show that exports of rubber manufactures and insulated wire cables from the United States totalled $8,455,657 during the month of November, 1920. This does not include the exports to Porto Rico and Hawaii which amounted to $414,607 for the same period. The first group of figures shows a considerable increase over the export figures for October 1920 which amounted to $7,648,491. The exports to Porto Rico and Hawaii, however, show a decrease when compared to the October totals of $446,830.

The value of the articles exported for November 1920 not including those to our island possessions above mentioned, were as follows: Belting, $441,028; hose, $347,134; packing, $146,626; boots, $70,683; shoes, $965,492; druggists' rubber sundries, $174,304; soles and heels, $116,057; auto tire casings, $3,443,128; inner tubes, $511,219; solid tires, $286,266; all other tires, $78,520; all other manufactures of rubber, $841,302; insulated wire and cables, $1,033,898. Exports to Porto Rico and Hawaii for November 1920 were as follows: Belting, hose and packing, $40,998; automobile tires, $274,623; all other tires, $3,378; all other manufactures of rubber, $95,608.

Fort Wayne Reorganized

The reorganization of the Fort Wayne Tire & Rubber Company have been completed, and with L. R. Welker as the new president, a number of new directors named and with L. E. Kraft and J. C. Brown having turned over their stock to retire from the company, the organization is now in a position to resume active operations within a short time, according to C. M. Billings, newly elected secretary and treasurer. The amount of stock turned over by Kraft and Brown amounts to a total of $102,480, at par value.

Albert E. Thomas has been named a member of the board of directors, as have P. F. Hunt, of Bluffton; Dr. G. L. Shumaker, North Manchester; August Chenoweth, Warsaw; J. P. Gerhardt, Garrett; Albert Feigert, Wren, Ohio, and E. D. Engler, of Decatur.

Pure Antimony Pentasulphide

The trade will be interested in a new development in the domestic antimony industry, namely, the production of a pure antimony pentasulphide carrying only free sulphur. It is claimed that most grades of golden antimony contain calcium sulphate ($CASO_4 \cdot 2H_2O$) the percentages contained varying from 30 per cent to 55 per cent. Some manufacturers object to calcium sulphate on account of its water crystallization and recognize its defect as a filler on account of its relatively large particle size.

The Rare Metal Products Company, Belleville, N. J., have developed such a grade of golden antimony, free from adulteration, and carrying 16 per cent free sulphur which they call Standard Golden Pentasulphide No. 7A. The producers claim that the product will enable manufacturers to make a red tube of a finer texture at a cost actually less than where the adulterated product is used. A very beautiful color is also claimed.

Rubber Exhibition in London

Bulletins have been recently received form the Rubber Growers' Association giving a detailed account of the conditions governing the exhibitions at the Fifth International Rubber and Other Tropical Products Exhibition which will be held in London, June 3-17, 1921. In addition mention is also made of the awards for competition which are to be offered by the association. The various classes of competition relating to rubber and rubber products are as follows:

Competition No. 1. For the best commercial sample of plantation rubber taken from a consignment of not less than fifty cases. The consignment to contain three grades as follows: 1. 75 per cent No. 1 sheet and (or) crepe; 2. 25 per cent brown crepe; 3. 25 per cent scrap crepe. No. 2 should consist of a clean light brown crepe, usually made from cup washings, lumps and anything not good enough to go into No. 1. No. 3 should consist of light or dark brown scrap crepe. These three grades must be produced by every estate as the object is to get a representative consignment of all three qualities. Awards consisting of medals, cups and cash prizes will be offered in respect of rubber produced in Malaya, Ceylon, Netherlands Indies, South India and Burma and Borneo.

Competition No. 2. For the best commercial sample of plantation rubber produced in countries other than those outlined in Competition No. 1. Similar rewards will be offered.

Competition No. 3. For the best exhibit of rubber flooring prepared either in blocks, tiles, linoleum or such form in which rubber constitutes a large part in its manufacture.

Competition No. 4. For the exhibit composed of the greatest variety of articles made from rubber for commercial purposes; open to exhibitors in the manufacturing section.

Entries for Competitions No. 1 and No. 2 will close on April 15. while entries for the last two competitions will close on May 16. Further information may be had from the Rubber Growers' Association, 38, Eastcheap, London, E. C. 3.

Swedish Rubber Imports

Statistics recently issued by the Swedish Chamber of Commerce of the U. S. A., New York, N. Y., show the following figures relating to manufactures of rubber made in the United States and imported by Sweden during 1918 and 1919:

	1918	1919
Scrap and old		$31,150
Reclaimed		23,837
Belting, hose and packing		198,058
Boots and shoes		
Boots		2,000
Shoes		169,843
Druggists' rubber, sundries		19,355
Tires for automobiles	$18,825	1,373,847
All other tires		620
All other manufactures of		116,114

Potts Resigns from Republic

F. W. Potts, for several years northwestern district manager for the Republic Rubber Co., at Minneapolis, Minn., has recently resigned. No announcement has been made regarding his plans.

MARKETS

Manufactured Rubber Goods

New York, February 5, 1921.

Improvement in the rubber industry is beginning to pass the talking stage, and is becoming a reality, according to reports from various trade centers. From Akron comes the cheering news that the tire manufacturers are resuming operations. One of the leaders announces an early increase in production to 10,000 tires a day, while another plans to jump its production to the 18,000 mark. The smaller manufacturers are extending their operations also, and there is increased confidence on all sides.

AUTOMOBILE TIRES

Tire manufacturers of Akron are credited with having commenced operations this year with orders for $50,000,000 worth of tires on their books. The larger manufacturers report that demand during January showed an increase of 50 per cent over that for December. Other manufacturers report increases of from 25 to 50 per cent in the demand for their tires.

Statistically, the position of the tire market is a very strong one. Surplus stocks have been seriously depleted by the buying during the current mild winter weather, and some factors in the market even go so far as to predict an actual shortage in tires when the season really gets under way early next summer. Manufacturers who had curtailed their production for the past several months, have worked out the heavy stocks which had accumulated before they shut down, and are not resuming operations.

Smaller manufacturers, who have long since liquidated their losses brought on by the falling markets for raw materials, are now able to produce tires at a lesser price than those turned out by the larger interests, which are still working to some extent on the crude stocks purchased at the peak of the market last year. Considerable selling competition is looked for during the 1921 season.

DRUG SUNDRIES

Manufacturers of drug sundries are feeling the general business depression to some extent, and the market is reported to have slowed down during the past fortnight. Demand for rubber sundries has not been particularly active thus far in the year due mainly to the very mild weather which the Eastern part of the country has been experiencing. Manufacturers report a steady routine call for their production, with druggists inclined to work on a hand to mouth basis.

MECHANICALS

Buying of mechanical rubber goods remains unchanged. The railroads are looked to as prospective heavy purchasers of mechanicals in the spring, but buying promises to be hampered to some extent by the financial difficulties of the roads. Since September 1, last, 200,000 men have been laid off by the different railroads in the country. Despite this, and other economies, the railroads still claim that they are unable to meet operating expenses from present earnings, and are unable to buy any additional equipment.

Buying of marine specialties is also slow at the present time, shipping being adversely affected by current business conditions. Some demand for belting is reported and manufacturers of nationally known lines are doing a fair business. Production of mechanical rubber goods is being held down to the minimum by all factors.

RUBBER FOOTWEAR

With prices reduced on all styles and varieties, manufacturers of rubber-soled summer sport shoes look for a good volume of business during the coming year. Many of the manufacturers have been using the cheaper grades of crude rubber for some time past, and have thus been able to cut their producing costs, owing to the cheapness of crude.

Rubber heel business has picked up in many parts of the country, although the demand lacks the snap which will be felt later on when the weather improves. Business in rubbers has generally been poor with the retail trade this season and the small store keeper is not in the market for additional stocks.

MISCELLANEOUS

Manufacturers of rubber specialties are looking for a better demand for their products this year, and are making plans for handling a good business.

Rubberized clothing manufacturers have recently been holding some cut price sales, one of the largest firms in the business putting on a big "direct to consumer" sale of its nationally-advertised products. The manufacturers have been forced to take this action through the lack of a ready outlet for their large stocks through the regular clothing stores.

Cottons, Yarns and Fabrics

New York, February 5, 1921

Cotton consumption continues very light, and the market is still in a weak position. Southern advices indicate that the growers are more determined in their efforts to curtail the acreage this year. One grower has suggested that the farmers buy back the futures already sold, hold what they have left of their crop, and plant their acreage to corn and alfalfa. Such a move, he argues, would not only stimulate market prices, but in addition would eliminate market speculators. This proposition, however, is not yet being taken seriously.

The most encouraging news, from the standpoint of the grower, came to New York yesterday in a wire which read: "Applications for more than $17,500,000 in loans for export trade from all parts of the South already have been received in New Orleans by the Federal International Banking Co., the South's foreign trade bank. The major portion of the export propositions already submitted to the bank are now being considered for export of cotton. The largest portion of it is to go to Germany."

February cotton sells on the New York Cotton Exchange a 13.70 cents per pound; March 13.85 cents; April 13.91 cents; May 14.11 cents; June 14.26 cents; and July 14.42 cents per pound.

EGYPTIAN COTTON

Egyptian cotton growers are now becoming infected with the "holding fever." A cablegram from Alexandria a few days ago said: "Syndicate (Egyptian) landowning cotton growers is in formation with the object of holding 2,000,000 cantars for sixty tallari; first meeting promises obtained 100,000 cantars writing." Spot cotton of the old crop is reported selling in the Egyptian market at 19½ cents per pound. Futures are quoted at 30.50 to 31.35 for March delivery. Prices for Egyptian long staple landed in Boston or New York are quoted; 42¾ cents per pound for fully good Sakellaridis; and 33¾ cents per pound for good fair Sakellaridis, both on c.i.f. terms. American spinners are not buying to any extent.

ARIZONA COTTON

Continued weakness is displayed in this branch of the cotton market, and all of the holding movement on the part of the growers is a failure thus far. American-Egyptian cotton is quoted at 33¾ cents per pound for No. 1 grade, and 32¾ cents for No. 2 grade, both f.o.b. New England mill points. Growers a few weeks ago were refusing to sell at 50 cents. New England spinners are reported to have on hand sufficient long staple to take care of the orders on their books.

DOMESTIC PREMIUM COTTON

With the Sea Island cotton crop at such a low level as to be practically without interest to commercial users of long staple cotton, more interest is being shown in Southern premium staple cotton. An irregular demand has been reported from many sections of the South, but buying appears to be concentrating at Memphis. Strict middling showing 1 5/16 inches staple has sold at 27½ cents, with 1¼ inch cotton at 26 cents, and 1 3/16 inch midling at 21 cents, wtih strict midling of the same staple held at 25 cents.

TIRE FABRICS

Representatives of leading spinners of fabrics for the tire trade continue to keep their prices withdrawn. The tire manufacturers have not yet actually come into the market for goods, and the few inquiries reported have not resulted in any business. It is believed in the trade that most of the larger tire makers still have on hand fair-sized supplies of tire fabrics, and until these stocks are used up, no additional buying is looked for. In the absence of any trading, our quotations are temporarily omitted.

HOSE AND BELTING FABRICS

Mechanical rubber goods manufacturers are not active in this branch of the market, and prices are still tending downwards. Representatives of manufacturers report that sales are very light, and limited to small quantities, consumers taking only sufficient stocks to cover their immediate consuming requirements.

DRILLS, SHEETINGS AND OSNABURGS

Firmness in the market for cotton goods is being replaced by softness, and the market is inclined to ease off somewhat on all grades and sizes. Increased production in many parts of the country is reported, but no over-production is looked for as the mills have been shut down for some time. Buyers are still asking deferred delivery on some of their shipment now becoming due. Prices on drills and sheetings are being shaded somewhat by some sellers, but the general market is nominally held at the prices quoted in the appended tables. Some routine demand for osnaburgs is reported, but prices are lower.

TIRE FABRICS

17¼-ounce Sea Island, combed, sq. yd.	Nominal		
17¼-ounce Egyptian, combed	—	@	—
17¼-ounce Egyptian, carded	—	@	—
17¼-ounce Peelers, carded	—	@	—
17¼-ounce Peelers, combed	—	@	—

(Note:—In the absence of important trading, all tire fabric prices are temporarily withdrawn by manufacturers.)

DUCKS

Belting (pound basis) lb.	.35	@	—
Hose (pound basis) lb.	.35	@	—
*Enameling lb.	.35	@	.40
Shoe Ducks lb.	.40	@	.42
Single filling yd.	.14	@	.18
Double filling yd.	.17	@	.20

*Price varies according to width.

DRILLS

37-inch 3.25-yard yd.	.10½	@	.10¾
37-inch 2.75-yard yd.	.11½	@	.12
37-inch 3.00-yard yd.	.11	@	—
37-inch 3.50-yard yd.	.10	@	—
37-inch 3.95-yard yd.	.09¼	@	.09½

OSNABURGS

30-inch 7-ounce	.08¾	@	—
40-inch 7-ounce	.10	@	—

SHEETINGS

40-inch 2.35-yard yd.	Nominal		
40-inch 2.50-yard yd.	.12½	@	.12¾
40-inch 2.85-yard yd.	—	@	—
40-inch 3.15-yard yd.	.12½	@	.13
40-inch 3.60-yard yd.	.09¾	@	.10
40-inch 3.75-yard yd.	.09	@	.09¼
40-inch 4.25-yard yd.	.08	@	—

Note—In view of the unsettled conditions prevailing in the market at the present time, the prices quoted above are more or less nominal, and are not guaranteed.

BURLAPS
(Carload Lots)

7 -ounce 40-inch	——	@	——
7½-ounce 40-inch	——	@	——
7½-ounce 45-inch	Nominal		
8 -ounce 40-inch	4.60	@	5.00
8½-ounce 40-inch	——	@	——
10 -ounce 36-inch	——	@	——
10 -ounce 40-inch	Nominal		
10 -ounce 45-inch	Nominal		
10½-ounce 40-inch	5.50	@	——

Chemicals and Compounding Materials

NEW YORK, FEBRUARY 5, 1921

Stability is greatly lacking in the market for chemicals and rubber manufacturers' compounding materials, and rubber manufacturers are still out of the market to a great extent. Numerous price flurries are reported, but the trend is still downward on most lines. Those articles which have stood up against the business depression for the past two or three months are now being quoted down by producers in an effort to stimulate consumption.

Producers of many items find the demand falling far short of the production, and operations are still being curtailed in numerous lines.

Rubber makers have not been active factors in the chemical and compounding materials markets for months past. While the trade figures that manufacturers still have on hand high-cost materials which they will use before they come into the market for the cheaper stocks, the feeling is general that when the demand does come it will come with a rush, and will amount to a big buying wave.

IMPORTS AND EXPORTS

Agitation for sharp tariff increases appears to be doomed to failure owing to widespread opposition to the emergency tariff bill. In this case the good suffer with the bad; those that really needed protection must lose it because of the attempted "grabs" of other interests.

There is a steady volume of imports reported, most of the stocks coming on future contracts. Export trading has not been active. In view of the renewed strength in foreign exchange rates, however, some improvement in the export situation is expected.

LITHOPONE

Demand for lithopone has shown a material increase following the action of leading producers in reducing their prices. As the market now stands, lithopone in bags offers at 7 cents per pound, and in barrels at 7¼ cents per pound, both for carlot quantities. Producers in naming the lower price levels let it be known that they were taking the step merely to stabilize the market. According to trade views, the market has now reached the bottom, and an upward movement is in order within a short time.

BARYTES

Offerings of barytes now exceed the demand for the product, and trading is of very light volume. Domestic producers are quoting the market at $25.00 to $27.00 for bulk Southern f.o.b. mills while Western is held at $24.50 f.o.b. Domestic floated in bags, pure white, is quoted at $32.00 to $38.00 per ton, with off color at $20.00 to $28.00. Buyers are taking stocks only as needed.

ZINC OXIDE

Expected price reductions in this branch of the market have failed to materialize. While some factors are still looking for a decline on zinc oxide, others express the opinion that the market has about reached the bottom. Producers reported a fair demand from consumers during the past fortnight. Prospective resumption of manufacturing in the rubber industry and in the automobile trade are bright spots on the horizon for the producers now.

LITHARGE

No further alterations in litharge prices are to be noted, and a quiet market for the product is reported in all quarters. Rubber tire manufacturers have not yet come into the market for supplies in any large quantities, but early buying is expected. Nothing definite is known in the trade as to the probable size of the holdings of the tire makers, but they are not believed to be large. American powdered in casks still offers at 8¾ cents per pound, with quantity prices unchanged.

DRY COLORS

In an effort to speed up buying, manufacturers of dry colors have staged several price cutting flurries during the past fortnight. No appreciable improvement in business is to be noted, and the market is showing weakness throughout. Reds are quoted generally downward on all grades. Prices on green colors were reduced, light c.p. chrome being off 2 cents per pound at 38 to 42 cents. Trading in browns has held quiet, with the market nominally unchanged. Reduced prices on blues are reported to have brought in a little more business than formerly, and the market is inclined to strengthen up again. Blacks are quoted lower throughout, with a dull demand ruling. Yellows are meeting with a routine movement.

WHITING

Rubber manufacturers are not yet in the market for whiting. As the rubber trade is the largest consumer, trading continues quiet. Dealers report a slight improvement in buying, but orders are still held down to small quantities, consumers taking stocks only as needed. In the absence of any improved demand, prices are held quotably unchanged. Dealers are unwilling to make any downward revision, feeling that such action would not have any good effect upon demand.

CRUDES

Benzol is offering down to 27 cents per gallon for the 90 per cent, and a better inquiry is reported reaching producers as

a result of the lower price. Pure holds at 30 to 36 cents per gallon, according to seller. No change in conditions in the market for solvent naphtha are to be recorded. Toluol is quoted unchanged at 30 to 36 cents per gallon, price varying according to quantity purchased. Xylol holds unchanged. Heavy offerings of phenol keep the market in a soft position, and prices are quoted 9 to 12 cents per pound for U.S.P.

Current Prices for Chemicals, Fillers, Colors, etc.

Acetone, carlots ..... lb.	.13	@	—
Acetanilid, C. P., bbls .... lb.	.25	@	.40
Acetone			
smaller lots ..... lb.	.13½	@	.14
Acids, Acetic, 56 per cwt. cwt.	—	@	—
Carbolic, C. P. ..... lb.	.09	@	.12
Muriatic, 20 deg. .. cwt.	1.70	@	2.50
Muriatic, 22 deg. .. cwt.	2.50	@	3.25
Nitric, 40 deg. .... cwt.	7.00	@	7.50
Nitric, 42 deg. .... cwt.	7.50	@	8.00
Sulphuric, 60 deg. .. car lots ..... tons	13.00	@	15.00
Sulphuric, 60 deg. car boys	21.00	@	—
Tartaric, crystals .. lb.	.39	@	—
Albalith	.07	@	.07½
Aluminum Silicate	Nominal		
Aniline oil, bulk basis Contract	—	@	—
Imported	Nominal		
Domestic	.20½	@	.30
Antimony—			
Oxide ..... lb.	.07	@	.09
Sulphuret, red ..... lb.	.25	@	.30
Sulhuret, golden .... lb.	.27	@	.30
Sulphuret, crimson .lb.	.40	@	—
Alcohol, denatured, 190 proof	—	@	—
Wood, 95 per cent	1.28	@	1.30
Ethyl, 190 proof	4.95	@	5.05
Aldehyde, Ammonia	Nominal		
Ammonia, powdered	.15¾	@	.16
Ammonium Carbonate, domestic ..... lb.	.15¾	@	.16
Amyl Acetate ..... gal.	3.60	@	3.75
Anthracene, 80 per cent ..	.80	@	1.00
Anthroquinine, 95 per cent ..	1.85	@	2.00
Asbestine	Nominal		
Asphaltum, Egyptian .... lb.	.20	@	.25
Domestic ..... ton	.30	@	.40
Barium, dust ..... lb.	.05½	@	—
Barytes, prime white imported ..... ton	Nominal		
white, domestic .... ton	32.00	@	38.00
off-color, domestic .... lb.	20.00	@	28.10
Southern, f. o. b. mills .	25.00	@	27.00
Western, f. o. b. mills .	24.50	@	—
Beeswax	.16	@	.54
Benzidine Base ..... lb.	.95	@	1.00
Benzol, 90 per cent	.27	@	.34
Benzol, pure bulk, 100	.30	@	.36
Blanc Fixe, dry, bbls .. lb.	.05	@	.05½
Burgundy Pitch, dom. .. lb.	.05	@	.06½
Foreign	.60	@	.65
Blacks, Drop ..... lb.	.08	@	.20
Ivory ..... lb.	.16	@	.45
Carbon, gas, cases .. lb.	.12	@	.20
Lampblack, R. M. ..... lb.	.16	@	.45
Mineral blacks .... ton	30.00	@	40.00
Blues, Prussian ..... ton	.60	@	.65
Soluble ..... lb.	.65	@	.70
Ultramarine ..... lb.	.15	@	.35
Browns,			
Umber, Turkey, burnt powdered ..... lb.	.05	@	.06½
American, burnt .... lb.	.04¼	@	.05
Cadmium, sulphide, yellow lb.	1.40	@	1.45
Carbon, Disulphide, bulk .lb.	—	@	—
Bisulphide ..... lb.	.08	@	.09
Casein, C. P. ..... lb.	.45	@	.48
Castor Oil	.10½	@	.12
Caustic Soda, 76 per ct. cwt.	3.90	@	4.00
Chalk, precipated, extra light ..... lb.	.04¾	@	.05
heavy ..... lb.	.03½	@	.04
China clay, domestic .... ton	10.00	@	12.00
imported ..... ton	16.00	@	25.00
China Wood Oil, bbl. .... lb.	.09½	@	.10
F. o. b. Pacific Coast ..	.08¼	@	.09
Chloroform, U. S. P.	.40	@	.43
Clay, Dixie ..... ton	22.00	@	—
Blue Ridge ..... ton	22.00	@	—
Coal Tar Pitch	—	@	—
Cottonseed Oil, crude, f. o. b. mills ..... lb.	6.25	@	—
Prime summer yellow .	8.40	@	—
..... bbls.	—	@	—
Dimethylaniline ..... lb.	.55	@	.60
Elateron	—	@	—
Formaldehyde, spot ..... lb.	.18	@	.20
Fullers Earth, powd., carlead lots	17.00	@	20.00
Fossil flour ..... lb.	—	@	—
Genasco Mineral Rubber	—	@	—
Gilsonite ..... ton	60.00	@	65.00
Glue, extra white ..... lb	.35	@	.45
medium ..... lb.	.28	@	.33
low grade	.20	@	.22
foot stock	.18	@	.20
brown foots	.18	@	.22
common bone	.16	@	.18
Glycerine, C. P. (drums) lb.	.20	@	.21
cans	.22	@	.23
Graphite, flake (bbl.) .... lb.	.14	@	.20
powdered (bbl.) .... lb.	.04	@	.10
Green, chrome, R. M. .. lb.	.38	@	.60
Ground glass (fine) ..... lb.	.03½	@	.04
Hexamethylene ..... lb.	1.25	@	1.30
Hexamethyenetramine .... lb.	1.10	@	1.15
Infusorial earth, powd'd .. lb.	.02	@	.035
bolted ..... lb.	.035	@	—
Iron ovide, red, reduced grades ..... lb.	.13	@	.15
red, pure, bright .... lb.	—	@	—
Kaolin	—	@	—
Lime, hydrated	—	@	—
Lead, red dry (casks) .... lb.	.09¼	@	.09½
sublimed ..... lb.	—	@	—
White, basic carb.	.08	@	—
white, basic sulp. .... lb.	.07¼	@	.07½
Lime flour ..... lb.	—	@	—
Litharge (casks) ..... lb.	.08¾	@	.09
English ..... lb.	—	@	—
Lithopone, domestic, bbls. lb	.07¼	@	—
in bags ..... lb.	.07	@	—
M. R. X.	—	@	—
Magnesia, carbonate ..... lb.	.15	@	.17
calcined light ..... lb.	.60	@	.65
Magnesite, calcined, pwd. ton	50.00	@	65.00
Magnesia, Oxide, heavy	—	@	—
Licht	—	@	—
Extra light	—	@	—
Napthalene ..... lb.	.07¾	@	.08½
Nitrobenzol	.12	@	.14
Naphtha, motor gasoline, (steel bbls) ..... gal.	.19	@	—
68 @ 70 degrees (steel bbls.) ..... gal.	.38	@	—
70 @ 72 degrees (steel bbls.) ..... gal.	.39	@	—
73 @ 76 degrees (steel bbls.) ..... gal.	.41	@	—
machine (steel bls.) gal.	.50	@	—
Oil, corn, crude factory cwt.	8.61	@	—
corn, ref. (bbls.) .cwt.	10.76	@	—
linseed, (bbls.)	.77	@	—
In carloads, spot	.74	@	—
Tank cars	.67	@	—
Oil palm, Lagos ..... lb.	.07½	@	.07¾
Niger	.07	@	—
Pine, yellow ..... gal.	1.40	@	1.45
Distilled ..... gal.	1.45	@	1.50
Rapseed, refined .. gal.	1.05	@	—
Rapseed blown ... gal.	1.14	@	—
Rosin, first rectified gal	.63	@	.65
Second, run	.65	@	.67
Tar (commercial .. gal.	.38	@	.41
Oleum Acid, 20 per ct. .. ton	22.00	@	25.00
Orange mineral, Amer. .. lb.	.12¼	@	.14
Imported ..... lb.	Nominal		
Ozokerite	Nominal		
Paraphenylenediamine .... lb.	1.75	@	2.25
Petrolatum, bbls., amber. .lb.	.08	@	—
Pale yellow ..... lb.	.07½	@	.08½
Parafin, refined, 118 @ 120 m. p.	.08¾	@	.09
127 @ 129 m. p.....	.09¾	@	.10¼
137 @ 140 m. p.	—	@	—
Phenol	.09½	@	.12
Pumis	.03	@	.08
Pine tar kiln ..... bbl.	15.00	@	—
Pitch ..... bbl.	9.00	@	—
Plaster of paris ..... bbl.	4.25	@	4.50
Red Tuscan ..... lb.	.22	@	.30
Red (American) .... lb.	.14	@	.16½
Indian (English)	.14	@	.16½
Standard ..... lb.	—	@	—
Rosin (common to good)— 280 lbs.	8.10	@	8.50
Rotten stone, powdered .. lb.	.02½	@	.04½
Rubber, substitute, black .lb.	—	@	—
White ..... lb.	—	@	—
Brown ..... lb.	—	@	—
Mineral, Hard Hydrocarbon ..... ton	42.00	@	—
Rosin Oil, first rectified	.63	@	.67
Second rectified	.65	@	.67
Third rectified	.65	@	—
Fourth rectified	.85	@	—
Soda ash, light 58 pct. cwt.	1.95	@	2.15
Sodium Nitrite 96 @ 98 pct.	.16	@	.17½
Solvent Naptha, crude, hvy.	.28	@	.34
Soya Bean Oil, bbls. .... lb.	.08	@	.08½
Sellers, tanks, f. o. b. Coast	.05½	@	—
Stearic Acid, single	.12¼	@	—
Shellac, fine orange .... lb.	.80	@	.81
Sulphur Chloride, drums...	.06½	@	.16
Shellac			
T. N. ..... lb.	.57	@	.58
Bleached, ordinary .. lb.	.55	@	.60
Bleached, bonedry .. lb.	.68	@	.72
Silex (silicia) ..... ton	25.00	@	40.00
Soapstone, powdered ... ton	15.00	@	20.00
Starch, corn, powd. ..cwt.	2.93	@	3.41
Pearl	2.83	@	3.31
Jap potato, duty pd. .lb.	.05½	@	—
Sulphur, crude ..... ton	—	@	—
100 pounds	—	@	—
Roll	2.85	@	2.95
Commercial superfine ..	2.10	@	2.75
Talc, American ..... ton	18.00	@	20.00
French ..... ton	30.00	@	36.00
Thiocarbanilid	—	@	—
Tolulol, pure, in drums, gal.	.30	@	.36
Commercial	.30	@	.32
Tripolite earth ..... lb.	.01½	@	—
Turpentine, pure gum— Spirit ..... gal.	.70	@	—
Wood ..... gal	.68	@	.70
Venice, artificial ..... gal.	.15	@	.18
True	2.85	@	3.00
Vermillion, English ..... lb.	1.00	@	1.10
American	.25	@	.30
Vorite	Nominal		
Wax, beeswax, crude, yel. lb.	.21	@	.22
Refined	.26	@	.27
Bayberry	.30	@	.32
Ceresin, white ..... lb.	.14	@	.15
Yellow	.13	@	.14
Whiting, commercial .... cwt.	1.40	@	—
Gilders Bolted	1.45	@	—
Paris, white Amer. .cwt.	1.50	@	1.60
English ,cliffstone. .cwt.	2.00	@	—
Quaker ..... ton	13.00	@	—
Xylol (gal) pure	.42	@	.45
Commercial	.30	@	.35
Zinc Oxide, French process Red Seal	.10	@	.10½
Green Seal	.11	@	.11½
White Seal	.12¼	@	.12½
Leaded Grades—			
Commercial, lead free ..	.08¾	@	.09¾
5 per ct. lead sulphate..	.08	@	.08½
10 per ct. lead sulphate	.07¾	@	.08½
20 per ct. lead sulphate	.07¾	@	.08¼
35 per ct. lead sulphate	.07¾	@	.08¼
Zinc Sulphate	.03¼	@	—

Crude Rubber

NEW YORK, FEBRUARY 5, 1921

Sharp price advances scored in crude rubber prices towards the middle of January have not been maintained, and the market has slipped back several cents per pound. The early spurt was brought on by an over-dose of optimism, which lacked the backing of a real improvement in conditions.

Prices of spot and future positions have been steadily declining since the first re-action and sellers are now finding it hard to locate buyers willing to take stocks at more than 17 cents per pound, for prime quality spot sheets. The market is once again in favor of the buyer on all grades and price concessions are generally secured when a firm bid is submitted at a little under the market.

A large part of the buying now being done is for April to June delivery, according to sellers. Manufacturers, particularly those of automobile tires, believe that their industry will once again be on a firm footing by this time, and so are contracting for stocks for delivery at that period. Spot buying is confined to very small lots.

Sellers are very reluctant in making offers for delivery during July of 1921 and later on. Sellers believe that by this time the market for crude rubber will be materially higher, and so are unwilling to contract ahead at present low prices.

Manufacturers of mechanical goods are practically out of the market insofar as buying of large quantities is concerned. Production is greatly curtailed in this line

at the present time. Buying by the drug sundries manufacturing trade has also shown a sharp falling-off since early in January. Rubber heel manufacturers are buying some roll brown crepe and are also taking a little ribbed stocks.

Those in the trade who are still holding to their optimistic views on the outlook are much encouraged over the reports of increased production of auto tires. One tire manufacturing concern is reported to have purchased enough rubber to last it for the next four months, paying 16½ cents per pound. Manufacturers who have high-priced rubber still coming to them on contracts, are letting these stocks come forward to their factories. The large surplus of rubber which was glutting the New York market towards the latter part of 1920 is now nearly exhausted, according to the dealers.

Smaller tire manufacturers, who did not load up on future delivery rubber last year, are furnishing a good part of the present buying support. These manufacturers are covering their needs from month to month, sometimes from week to week, and so are in a posititon to take advantage of all the price recessions and are always around to pick up any particular distress offerings which may be on the market.

Arrivals of crude rubber are steadily falling off. Total imports during December of 1920 amounted to less than half of that for the same month in 1919. According to reports received by importers here, growers are adhering strictly to their pledge to reduce acreage. Plantation operators in the Malay States are credited with having cut down their monthly production to about 40 per cent of normal. The effect of this acreage curtailment will of course not be felt for several months yet, but importers and brokers believe that its ultimate effect will be to cause sharp advances in selling prices.

Ceylons			
Smoked sheets, ribbed, spot	.16½	@	—
Smoked sheets ribbed Feb. Mch.	.17½	@	—
Smoked sheets ribbed Feb. June	.19	@	—
Smoked sheet plain, spot	.16	@	—
First latex pale crepe	.18½	@	—
Amber crepe, No. 1	.16	@	—
Amber crepe, No. 2	.15	@	—
Amber crepe, No. 3	.14	@	—
Clean brown crepe	.14½	@	—
Light clean brown crepe	.16	@	—
Roll brown crepe	.12½	@	—
Grand Central crepe	.13	@	—
Africans			
Loando Niggers	.08	@	—
*No. 1 Benbuella	.08	@	—
*No. 2 Benbuella	.07	@	—
Lapori Ball	.13	@	—
Paras			
Up-river fine	.18	@	—
Up-river medium	.14	@	—
Up-river coarse	.13	@	—
Caucho ball	.14½	@	—
Islands fine	.17	@	—
*Maderia fine	.21	@	—
Cameta	.11	@	.11½
Islands coarse	.11	@	—
Centrals			
Corinto prime	.14	@	—
Esmerelda prime	.14	@	—
Miscellaneous			
Guayule wet	—	@	—
*Balata block Panama	.28	@	—
Balata sheets	.69	@	—
Palembang	.06½	@	—
Bangermaasin	.06	@	—
Columbian Block Balata	.46	@	—
Prime Pontianac	.06	@	—

*Nominal

Scrap Rubber

NEW YORK, FEBRUARY 5, 1921

Dealers have been heartened somewhat by the appearance of a little foreign buying interest in the local market. While export orders are not heavy on any particular grade there appears to be a somewhat stronger inquiry for stocks of the more easily worked grades for shipment abroad.

The relapse in the market for crude rubber has taken a good deal of the element of firmness from the market for scrap. Dealers hailed the advancing market early in the month as a forerunner of better times ahead for their industry, and an immediate resumption of business was anticipated. This hope has not as yet been realized.

Reclaimers are coming into the market for small quantities of scrap from time to time, but are not buying in excess of their immediate requirements.

Stocks held by the scrap jobbers are fairly large, but the low prices are discouraging collecting to some extent. Stocks are still coming in rather freely, however, this being due mainly to the widespread unemployment. If industrial conditions were favorable, junk collectors would give up their business at present prices.

	Cents	per	Pound
Solid Tires	1.50	@	2.00
Auto Tire Peelings	2.50	@	2.75
Truck Tires	1.00	@	1.75
Black Rubber	1.50	@	2.00
Boots and Shoes	3.00	@	3.50
Arctics, trimmed	2.75	@	3.50
Arctics, untrimmed	—	@	—
Tire—Automobile	1.00	@	1.25
Bicycles, pneumatic	.75	@	1.00
Mixed Hose	.50	@	.75
Air Brake	1.50	@	—
Inner Tubes No. 1	6.50	@	7.00
Inner Tubes, No. 2	4.50	@	5.00
Red Tubes	2.50	@	4.00

Akron Stock Prices

(Special Akron Correspondence)

Rubber shares on the Akron stock market have exhibited a tendency to steady and hold their gains made with the start of the new year. Financial observers report a firm tone with the market in shape to continue the upward trend as soon as manufacturing activities start again.

Mohawk stock has demonstrated renewed strength and is now being held for 200 with 140 the best figure offered so far this year. Miller and Firestone common are steady around the 90 mark, while Goodrich common holds close to 40.

Following are the quotations for February 1:

	Bid	Asked
Amer. R. & T. com.	40	65
do pfd.	...	45
Firestone T. & R. com.	85	90
do 6 pct. pfd.	84	85
do 7 pct. pfd.	78	80
General T. & R. com.	...	150
do 7 pct. pfd.	80	90
B. F. Goodrich com.	40	41
do 7 pct. pfd.	82	84
do 5 pr. 7. pct. pfd.	90½	91½
Goodyear T. & R. com.	21½	22
do 7 pct. pfd.	46	47
India Rubber com.	100	130
do 8 pct. pfd.	...	80
Mason T. & R. com.	19½	20
do 7 pct. pfd.	66	67
Marathon T. & R. com.	2	4
Miller Rubber com.	88	92
do 8 pct. pfd.	88	90
Mohawk Rubber	140	200
Portage Rubber com.	21½	22
do 7 pct. pfd.	43	44
Republic Rubber com.	1⅛	1⅜
do 7 pct. pfd.	40	45
do 8 pct. pfd.	14	15
Rubber Products	...	100
Star Rubber com.	...	100
do 8 pct. pfd.	...	100
Swinehart T. & R. com.	...	100
do 7 pct. pfd.	...	70
Phoenix Rub. com.	...	20
do pfd.	...	90
Standard Tire com.	...	125
do pfd.	...	90

American Rubber Patents

ISSUED JANUARY 11, 1921

1,364,870—To Rex Ehle, Council Bluffs, Iowa. Cord tire.

1,364,928—To Warren S. Gauntt, St. Louis, and Butler B. Morris, Kansas City, Mo. Reinforcement for tire casings.

1,364,930—To Richard W. Goodhart, Pensacola, Fla. Sectional pneumatic tire.

1,364,931—To Richard W. Goodhart, Pensacola, Fla. Pneumatic tire.

1,365,947—To Francis M. Molloy, Baltimore, Md. Tire-spreader.

1,364,985—To William C. Ehrenfield, Flemington, N. J. Tube connecting and vulcanizing means.

1,365,057—To William H. Northall, Evansville, Ind., assignor one-fourth to Samuel C. James, one-fourth to Herbert Males, Evansville, Ind. Vehicle-wheel tire.

1,365,066—To Elmer E. Shoopman, Cairo, Nebr. Machine for wrapping and unwrapping tires.

1,365,076—To Oliver H. P. S Anderson, Los Angeles, Cal. Tire construction.

1,365,104—To Andrew Huetter, Dayton, Ohio, assignor to the Firestone Tire & Rubber Co., Akron, Ohio. Expansible core for curing tires.

1,365,115—To Harvey F. Maranville, Akron, Ohio, assignor to the Firestone Tire & Rubber Co., Akron, Ohio. Tread-curing press.

1,365,171—To Samuel E. Henrie, Provo, Utah. Vehicle-wheel tire.

1,365,243—To William Heggie, Dublin, Ireland. Tire for motor cars and other vehicles.

1,365,280—To Abraham Sacks, Brooklyn, N. Y. Tire-casing.

1,365,294—To George E. Tiller, Sioux City, Iowa. Tire-mold.

1,365,327—To Elmer G. Kimmich, Akron, Ohio, assignor to the Goodyear Tire & Rubber Co., Akron, Ohio. Method of curing hose.

1,365,350—To Thomas Sloper, Devizes, England. Vehicle tire.

1,365,365—To James W. Arthur, Akron, Ohio, assignor to the Williams Foundry & Machine Co., Akron, Ohio. Vulcanizing apparatus.

1,365,375—To Edward O. Carvin, Alleghany, Cal. Tire-deflation indicator.

1,365,434—To Ray W. Wood, Richwood, Ohio, assignor one-half to Bennie O. Rutter, Richwood, Ohio. Tire.

1,365,462—To Neil D. Crawford, Milford, Conn., assignor to the Mechanical Rubber Co., Method and apparatus for making inflated rubber articles.

1,365,528—To Harvey F. Mitzel, Providence, R. I., assignor to the Revere Rubber Co. Dipping apparatus for producing rubber articles.

1,365,539—To John W. Pepple, San Antonio, Texas, assignor of one-tenth to John J. Rowe, Akron, Ohio. Vehicle-tire.

1,365,560—To William J. Steinle, Elmhurst Heights, N. Y., assignor to the Hartford Rubber Works Co. Method and apparatus for making cords and other like apparatus.

1,365,581—To Harold G. Ballou, Los Angeles, Cal. Tire-cleaning apparatus.

1,365,588—To Carl Gustave Cronquist, Bridgeport, Conn., assignor by mesne assignments to the Locomobile Co., Bridgeport, Conn. Spare-tire holder.

ISSUED JANUARY 18, 1921

1,365,767—To Joseph Contento, Albany, N. Y. Non-slipping sole.

1,365,820—To Alfred A. Dennis, Grand Rapids, Mich. Tire-valve.

1,365,903—To Alfred L. Forrest, Baltimore, Md. Non-slipping attachment for vehicle-wheels.

1,366,051—To Harry L. Bethel, Millville, N. J., assignor one-third to Joseph B. Sharp, and one-third to Clayton E. Woodruff, Bridgeton, N. J. Cushion-tire.

1,366,080—To Samuel Kaufman, Boston, Mass. Puncture-proof tire.

1,366,173—To Herman Hanry Fischer, Lebanon, Pa., assignor of one-half to Benjamin F. Patschke, Lebanon, Pa. Tire-rim tool.

1,366,220—To James A. Swinehart, Akron, Ohio. Process of making tires.

1,366,239—To Robert J. Barr, Goodyear, Ariz. Tire-holder.

1,366,240—To John F. Brennan, Williamsport, Pa. Tire-carrier.

1,366,290—To F. Smith and T. H. Brittain, Akron, Ohio. Automobile-tire-molding core.